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LATTA'S APPARATUS FOR THE REDUCTION AND RETENTION OF FRACTURES.

We present our readers this week with full engravings of a new apparatus for the reduction and retention of fractures of the lower extremities. As these injuries are of daily occurrence, liable to happen to every one, any attempt to improve their treatment is of public importance. The old mode of treatment compelled the patient to lie on his back in a state of enforced idleness for at least two months, while this new apparatus not only enables him to sit up, recline, or lie down at pleasure, but to pursue any business or to do any kind of work that he could do while sitting in a chair if well. When it is recollected that the loss of time is often considered the most serious result of the injury, the value of the improvement will be clear enough. It is evident that this freedom of posture and occupation of the body and mind tends to preserve the health of the patient, to increase the reparative power of the system, and promote a rapid cure.

In Fig. 1 the details are given. The bed splint is shown at A, and a long steel rod, B, is attached to the top of it by a socket, C, and at the bottom passes through a cross bar, D, on rollers. To the crossbar a scale and spring balance, E, is attached by a clamp which slides in a slot in the cross bar, and may be changed from one side to the other. The frame of the spring balance has also a slot in it to enable the scale to be elevated or depressed at pleasure. The lower half of the rod has a thread cut on it, on which is a thumb screw, F.

It is admitted by the highest medical authority that the management of fractures of the lower extremity is the most difficult part of surgery; and it is further admitted, that with the best means of treatment heretofore in use, not more than one-half of the cases can be brought to a satisfactory conclusion.

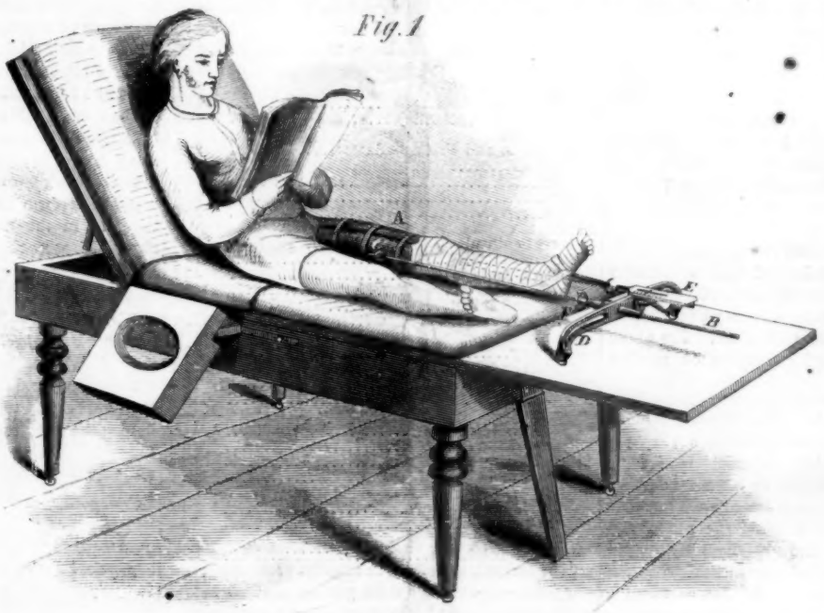
The number of cases annually occurring in the United States is estimated at over six thousand; consequently more than three thousand persons, many of them young, are every year turned out upon the world in a crippled condition. This simple statement shows the urgent necessity for improvement in the mechanical appliances made use of in such cases.

The plan here represented is designed, if possible, to obviate the difficulties that surgeons have had to encounter. The mode of application is as follows:—

The patient is first placed upon the fracture bed, and the limb is held by assistants until the dressing is applied on the lower part of the leg. The fracture is now reduced, and the bed splint, as shown in Fig. 1, is applied and properly secured by straps around the thigh. The upper end of the rod is slipped into the socket at the top of the bed splint, and the loop of plaster, at the bottom of the foot, is attached to the hook on the scale. The nut on the rod is then turned down, carrying the cross bar with the foot attached along with it until the necessary amount of strain or extension is secured. The amount of strain is shown by the pointer on the scale, and it enables the nurse to keep the tension exactly at the point indicated by the surgeon. A fracture dressed in this way is almost free from pain.

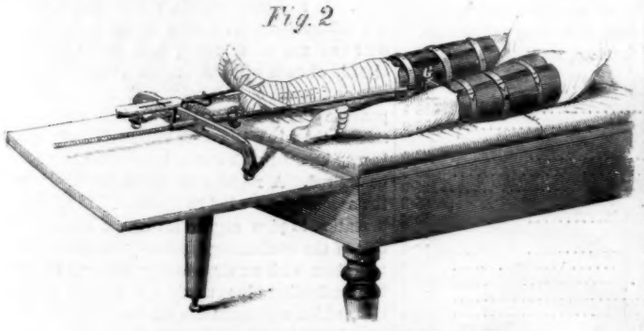
The details in Fig. 2 are the same as in Fig. 1, with the addition of a second bed splint, both being attached to the top of the rod by a crosshead, G. This engraving also represents the mode of applying the dressing in case both limbs are broken, both limbs being dressed alike.

Fig. 1



THE PATIENT IN POSITION.

Fig. 2

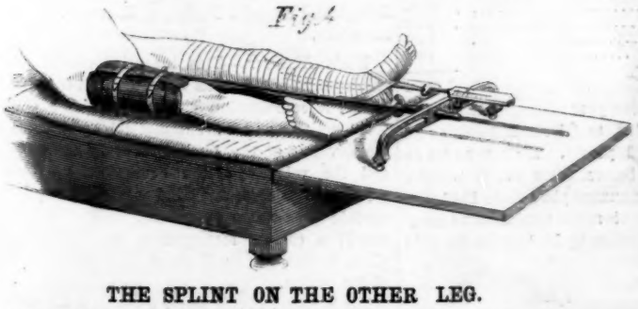


THE APPARATUS ON BOTH LEGS.

Fig. 3

HOW THE LENGTH IS OBTAINED.

Fig. 4



THE SPLINT ON THE OTHER LEG.

Fig. 5

THE SPLINT THE WHOLE LENGTH OF THE LIMB.

Fig. 3 represents a measuring apparatus to make both legs of the same length. A crutch head, H, is substituted for the bed splint. The length of the limb is determined by means of a scale on the extending rod. It is often of the utmost importance for legal, as well as surgical reasons, to be able to get the exact length of the limb, but the old way of doing it with the tape line is entirely unreliable. By the plan here proposed, the surgeon can get the length of the limb as certainly as a carpenter could get that of a plank.

Fig. 4 is the same as Fig. 1, except that the bed splint is placed upon the opposite limb. Sometimes the fractured limb is so bruised or wounded, that pressure upon it can not be borne. Under the old methods of treatment nothing could be done with such a case, but by the adoption of this device the counter extension is shifted to the sound side, and the strain is kept up without difficulty. The same plan is applicable to the treatment of acute inflammation of the hip joint without fracture.

Fig. 5 is the same as Fig. 1, only the bed splint is intended to reach the whole length of the limb. This represents a new plan for the treatment of fracture of both bones of the leg below the knee. When both bones of the leg are broken all control over the foot is lost, and it falls about any way, independent of the will or wish of its owner, and it was a common occurrence to find, after reunion was effected, the foot turned in or out so as to create deformity and lameness. This plan enables the surgeon to keep the foot exactly in the right position.

This apparatus was patented through the Scientific American Patent Agency, June 17, 1862, and another application is pending before the Patent Office, by Dr. M. M. Latta, of Goshen, Ind., who may be addressed for further information at that place. The entire patent is for sale. [See advertisement on another page.]

Indelible Ink.

Gold ink is made by grinding upon a porphyry slab, with a muller, gold leaves along with white honey, till they become reduced to the finest possible division. The paste is then collected upon the edge of a knife or spatula, put into a large glass, and diffused through water. The gold by gravity soon falls to the bottom, while the honey dissolves in the water, which must be decanted off. The sediment is to be repeatedly washed till entirely freed from the honey. The powder, when dried, is very brilliant, and when to be used as an ink, may be mixed up with a little gum water. After the writing becomes dry, it should be burnished with a wolf's tooth.

Silver ink is prepared in the same manner.

Indelible Ink.—A very good ink, capable of resisting chlorine, oxalic acid, and ablution with a hair pencil or sponge, may be made by mixing some of the ink made by the preceding prescription, with a little genuine China ink. It writes well. Many other formulæ have been given for indelible inks, but they are all inferior in simplicity and usefulness to the one now prescribed. Solution of nitrate of silver thickened with gum, and written with upon linen or cotton cloth, previously imbued with a solution of soda, and dried, is the ordinary permanent ink of the shops. Before the cloths are washed, the writing should be exposed to the sun beam, or to bright daylight, which blackens and fixes the oxide of silver. It is easily discharged by chlorine and ammonia.

A good permanent ink may be made by mixing a strong solution of chloride of platinum with a little potash sugar, and gum to thicken. The writing made therewith should be passed over with a hot smoothing iron, to fix it.—*Ure.*

Nitrate of silver 1 to 2 dr ; water ¾ oz. ; dissolve, add as much of the strongest ammonia water as will dissolve the precipitate formed on its first addition, then further add mucilage 1 or 2 drachms, and a little sap green to color. Writing executed with this ink turns black on being passed over a hot Italian iron.

Asphaltum 1 part ; oil of tarpentine 4 parts ; dissolve, and color with printer's ink. Very permanent.—*Cooley.*

Production of Gold and Silver.

Many questions of interest suggest themselves connected with the relative production of the precious metals. Previous to the discoveries in California, gold uniformly commanded a premium; its influx at that time quickly destroyed this, and the continued demand for silver resulted in its being at a slight premium. The ounce of gold in London in 1848 was 77s. 6d., and the ounce of standard silver 59½ or 15⅝ for 1. With the influx of gold from California, France, as is well known, gradually exchanged her silver for a gold currency, and India absorbed the silver in exchange for silks and other commodities. During the war cotton at high prices has been added to other articles for which silver was sent to India. On Jan. 1, 1866, the price of silver was 62d, or 4·2 per cent rise since 1848.

These facts are of interest in connection with the following tables which we have compiled showing the total production of gold and silver since 1847. The first table gives the estimated amount of gold yielded by all the producing countries from 1848 to 1865, both years inclusive:

PRODUCTION OF GOLD, 1848–1865.

Countries of Production.	
NORTH AMERICA:	
Mexico, Etc	71·0
United States (Atlantic)	8·6
SOUTH AMERICA:	
Venezuela and N. Grenada	26·0
Bolivia	17·3
Brazil	42·6
Peru	24 7
Chili	20·3
ASIA:	
Malay Peninsula	28.2
Farther India	72·3
Eastern Archipelago	46·2
Japan	130·5
China and Thibet	304·8
NORTHERN EUROPE and ASIA	411·1
EUROPE:	
Germany	9·0
Austria and Italy	29·1
Spain	56·8
AFRICA	110·0
Total, Old sources	1,408·6
UNITED STATES (Pacific)	1,056·5
BRITISH NORTH AMERICA	49·5
AUSTRALIA and NEW ZEALAND	792·0
Total, New Sources	1,897·0
Other Countries	36·0
Grand Total	3,341·5

[The amounts expressed in millions of dollars.]

The aggregate for eighteen years embraced in the statement being $3,341.500,000, gives for that period an annual average of $185,638,888 additional to the world's stock of gold—an average constantly on the increase by the opening of new regions and the adaptation of scientific processes to its extraction.

PRODUCTION OF SILVER, 1848—1865.

Countries of Production:	
NORTH AMERICA:	
Mexico, Etc	580·0
United States	53·0
SOUTH AMERICA:	
Bolivia	72·0
Brazil	29·5
Peru	120·0
Chili	65·8
Venezuela and N. Granada	19·6
ASIA:	
Malay Peninsula	18·0
Farther India	36 0
Japan	144·0
China and Thibet	206·6
NORTHERN EUROPE and ASIA	66·0
EUROPE:	
Germany	39 5
Austria	36·0
Spain	49·5
England	11·3
AFRICA	24·0
Other countries	50·2
Grand Total	1,620·4

For the whole eighteen years the production has thus apparently amounted to $1,620,400,000, or on the average $90,022,222 yearly. Except so far as relates to the United States, there has been but a moderate increase in the annual yield since 1847.

To obtain the weight of metal produced we must multiply the amount in dollars by 25·8 grains for gold and by 412·5 for silver, thus—

Gold.	Silver.
3,341,500,000 dols.	1,620,400.000 dols.
25·0	412·5
86,210,700,000 grs.	668,415,000,000 grs.
12,315,814 lbs.	95,487,857 lbs.
6,157 tuns.	47,743 tuns.

or nearly in the proportion of eight tuns of silver to every tun of gold produced.

The above, however, is gold and silver nine-tenths fine, and to reduce them to fine metal a tenth must be deducted. The quantity of fine gold produced was thus approximately 5,542 tuns avoirdupois, or 307½ tuns a year, and the quantity of fine silver, 43,-969 tuns, or 1,832 tuns a year.

A cubic inch of water weighs 252½ grains, and the specific gravity of gold is 19 3, or gold is so many times heavier than water Hence, a cubic inch of gold weighs 4,873¼ grains, 0·69618 lbs. avoird. A cubic foot is 1,728 such cubic inches, and the weight of a cubic foot of gold is about 1,203 lbs. avoird. The whole of the fine gold produced in eighteen years was 5,542 tuns, or 11,084,000 lbs., an amount which would occupy a space equivalent to 9,213½ cubic feet. A solid shaft 92 feet high and 10 feet square would represent this amount. It would build a wall 1,842½ feet long, one foot thick and five feet high. If melted it would fill 68,916 wine gallons, or about 1,094 hogsheads of 63 gallons. Such illustrations will aid the mind in comprehending the magnitude of the gold heap collected from the various sources yearly, or as above, in a period of years. Cut into slabs one inch thick, the same amount would cover a space of 110,562 square feet! Divide any of the above sums by 18 and you obtain the weight, bulk or extent of the annual gold crop.

The specific gravity of silver is 10 5, or it is so many times heavier than water. It will therefore take not much more than one-half the weight of this metal to perform the same offices we have assigned to gold in the above calculations.—*Hunt's Merchants' Magazine.*

NEW INVENTIONS.

Water Wheel.—This invention relates to an improved water wheel of the class commonly termed the "Jonvil Turbine," and it consists in a peculiar construction and arrangement of the buckets, and their application to the wheel, and in a means for relieving the lever end of the wheel shaft and step from the weight of the wheel, as well as in a peculiar arrangement of gates, whereby it is believed that many advantages are obtained over other wheels of the same class in use. Henry Van Dewater, of Buffalo, N. Y., is the inventor.

Musical Instrument.—This improvement consists in applying a large reed to reed instruments or pipe organs, for the purpose of producing a tremulo tone. It may be applied in different ways, and its vibration is to be so slow as not to produce a musical tone. In reed instruments, of the class of melodeons and cabinet organs, it may be inserted in the reed board as are other reeds, and used with the swell closed, when it will put the air in motion both outside and inside of the reeds and reed board, and so produce the tremulo tone. Or it may be placed inside of the wind box with the swell open or closed. It may be used with one or more sets of reeds, as may be desired. A register should be provided to govern the access of the wind to the reed. In applying this invention to pipe organs it may be attached to the side of the conducting pipe between the bellows and wind box, with an air passage through the sides of the conducting pipe sufficient to put the reed in motion, which will cause the air inside of the conducting pipe to be vibrated so as to produce a tremulo. In all cases it is to be used with a valve and register. Joseph and Ephraim Foster, of Keene, N. H., are the inventors.

Water Elevator.—This invention consists in the employment of a friction wheel of novel construction, which, in combination with a crank, also of novel construction, and an automatical operating pawl, the elevation of the bucket is easily accomplished, and the velocity of the descent of the same is perfectly regulated, one hand only being required to operate the entire apparatus. With this elevator, should a carless management of the crank take place, no accident could occur by a too rapid descent of the bucket.

The inventor of this water elevator is Edwin Hoyt, Stamford, Conn., and the patent was issued April 3, 1866.

Back Numbers.—New subscribers are informed that the back numbers of the present volume are out of print. Subscriptions are entered from the date of their receipt.

THE MANUFACTURE OF COLD-DRAWN STEEL TUBES

Nearly two years ago we drew attention to a new and exceedingly remarkable process—the manufacture of steel tubes by cold drawing. At that time this process was so far in its infancy that it could hardly be considered as more than a scientific curiosity. The machinery erected at Willow-walk, Bermondsey, although sufficiently complete to demonstrate the fact that steel tubes could be made by boring out an ingot and passing it through dies, was still so far from perfection that it could not be regarded in any other light than as the embodiment of first, and, in a sense, crude ideas. But to active minds two years afford ample time for the production of great results, and at the moment we write an influential company has been established, and steel tubes are now manufactured under the patents of Messrs. Harding, Hawksworth, and Christophe, on an extended scale, by elaborate machinery; while the details of the process have been so far perfected that there is no reason to doubt that the cold-drawn steel tube manufacture will very soon occupy an important place in the trade of the country. Boiler tubes are now used annually by hundreds of tuns. Hollow shafting is not in demand solely because a demand could not hitherto be supplied at a moderate price. Lining tubes for ordnance, rifle barrels, surface condenser tubes, etc., are manufactured yearly in immense quantities; and it is certain that any sensible improvement on existing means of production will be fully appreciated by the public. We regard, indeed, the operations of the new company as being important in the fullest sense of the word, and we feel some pleasure in laying before our readers ample details of this, possibly the most remarkable invention in the art of working in metals which has been introduced for many years.

Nearly five years have elapsed since the first experiments were made with the view to produce cold-drawn steel tubes commercially. The credit of the first idea is due, we believe, to Mr. G. P. Harding and Mons. L. Christophe, who, while residing in Paris in 1851, had constant opportunities for observing the remarkable softness, toughness, and ductility of a peculiar steel manufactured by Mr. Hawksworth, of Linlithgow, N. B. This gentleman has for many years devoted his attention to the production of a very peculiar soft steel intended for the rolls of calico printing machines, on which, as is well known, the pattern or device is impressed by causing them to revolve under excessive pressure in contact with a very hard steel roll, on which the device is first engraved. After years of experiment, Mr. Hawksworth succeeded in making steel of a uniform quality which left nothing to be desired, and it is to this steel that the process under consideration is indebted for its development. It is true that tubes can now be drawn from almost any good steel; but this was not the case in the beginning, and it is possible that the numerous failures met with in the earliest stages of the invention would have proved sufficiently discouraging to lead to its abandonment had it not been for the peculiar facilities afforded by Mr. Hawksworth's steel. Prior to the year 1851, tubes had indeed been made cold from steel, but only as curiosities. The method of manufacture consisted in beating up a short tube from a circular steel disk into a cup shape, and then driving this cup once or twice through a die. In this way only short lengths could be procured at an immense expense. In a word, such tubes were, as we have said, curiosities and nothing more.

The first experiments in the new process were made at Paris by Messrs. Harding and Christophe, and the results were, upon the whole, so encouraging that these gentlemen, in company with Mr. Hawksworth, patented the machinery employed. The process itself is, perhaps, hardly a good subject for a patent. It is not so much a novel invention as the legitimate development of an old idea—that of drawing wire. That steel could be drawn into tubes constitutes a discovery, not an invention. Nevertheless, the history of this process affords a striking illustration of the amount of time, skill, energy, and capital required to bridge over the space intervening between an original idea and its commercial realization. No one can imagine that in this case the realization would ever have been effected but for the protection afforded by the patent laws. Even now the success of the process depends almost altogether on the machinery employed, and on delicate manipulations, the knowledge of which has only been acquired by dearly-bought experience. The earlier experiments conducted at Paris went little beyond affording proof that the manufacture of tubes on a large scale by the new process was possible, but all the operations were confined—and are still, as far as regards Paris—to the production of rifle barrels. Sufficient was done, however, to show that there was a good opening for the investment of capital. Machinery of a more powerful kind was therefore erected on temporary premises in Bermondsey in 1864; and after a time a company was formed under the title of the "Cold Drawn Steel Tube and Ordnance Company (Limited)." The premises of the old London Zinc Company, in Macclesfield street, City road, were taken, powerful machinery erected, and after many and unavoidable delays, the manufacture of steel tubes in quantities, as a commercial speculation, has at last been commenced, and we believe we are correct in stating that the new company is now in a position to execute very large orders. But it is not to be supposed that the machinery as now constructed is identical with that originally patented. On the contrary, many patents have been taken out, and various improvements have been introduced from time to time during the last five years.

The process of manufacturing steel tubes of equal diameter from end to end is exceedingly simple. A solid ingot of sufficient size is placed in a drilling machine and bored right through from both ends at once. The size of the ingot and the diameter of the hole depend on the kind of tube to be produced. A short and very thick steel pipe is thus produced, and this pipe is then threaded on a rod having an excessively hard steel acorn-shaped head. This rod or mandrel is secured to one head stock of an hydraulic press. To a central frame work or headstock a die is fixed, exactly within which stands the acorn-head of the mandrel. The end of the tube having been slightly tapered down is then introduced into the die aperture, and affixed to the crosshead of the moving ram by means to which we shall refer presently. The force pumps are then put in motion and the tube is drawn through the die, thereby having its external diameter reduced, while the acorn-head of the mandrel imparts a beautiful glossy surface to its interior. After a few passes through the dies, the tube is annealed, and then passed again, and so on until the required length and thinness is attained. In making tubes for surface condensers, for example, a bar of steel 2 feet long and 2 inches in diameter is taken; this is perforated from end to end with a $\frac{3}{4}$ inch hole, and then drawn out through a series of dies into a tube or tubes $\frac{13}{16}$ths of an inch in diameter, $\frac{1}{32}$d of an inch thick, and 60 feet long, weighing $\frac{1}{4}$ lb. per foot of length instead of 10$\frac{1}{2}$ lbs., the weight of the original bar; and so far is this severe manipulation from injuring the metal that such a tube will resist a bursting hydraulic pressure of 7,000 lbs. or more than three tuns per square inch. The change which takes place in the position of the molecules is very remarkable; and in the fact that this change is so radical, resides, strangely enough, one of the best aids to the commercial success of the process. Only a good steel will endure the first and second drawing, which embody the most severe test to which the metal is exposed. The least flaw is thus detected in the earliest stage of the process, and the ingot can therefore be rejected before much labor has been expended upon it. The first two passes through the dies accomplished, the production of the finished tube becomes a matter of certainty, as the metal is apparently so consolidated by the drawing that it becomes enabled to resist all the rough usage to which it is subsequently submitted; and it must be borne in mind that the strain to which the metal is exposed becomes gradually diminished in amount as the frictional surfaces and the thickness become less.

It is obvious that where large quantities of tubes are to be produced, drilling the ingots constitutes a very important department of the manufacture. Great difficulties have, we believe, been encountered in producing a machine which would drill a large number of ingots simultaneously, and from both ends, with sufficient accuracy. It is easy enough to drill from one end only, but this involved too much time. Ten ingots are drilled at one time, with such approximate accuracy as suffices for every purpose. The machine only requires the attendance of one man and a boy, and can turn out from ten to twenty ingots, each producing from 20 feet to 40 feet of tubing according to thickness in ten hours. At present it is principally employed in drilling ingots for rifle and musket barrels, a special branch of the company's operations, the consideration of which we shall reserve for a second paper. Ingots of large size are sometimes drilled separately, much in the ordinary way, calling for no very special mention, but they are mostly produced by casting hollow, or by punching and rolling.

The drilling effected, the tubes are next brought to the draw bench. There are two of these benches at Macclesfield street. The larger of the two consists of two pairs of hydraulic cylinders 13 inches diameter and 12 feet stroke; the four rams are attached to a very massive crosshead supported by slide bars; and the tube to be drawn is placed between one pair of cylinders and coupled to the center of the crosshead. The dies are all formed in segments and packed tightly around the tube and within the die-holder. The mandrel is placed at the same time within the tube to maintain its internal diameter, or to increase it, as may be desired. Power is communicated by a set of six-geared, two-inch pumps, capable of producing a pressure of three tuns per square inch, or 800 tuns on the pair of rams. The velocity at which the rams move is 15 inches per minute, and the motion is perfectly equable, steady, and without vibration. The cylinders are fixed to strong cast-iron bed plates, and are heavily stayed both transversely and longitudinally. The die-holder is forged from a solid block of wrought iron, and has a sectional area at the weakest place of 160 square inches. The entire apparatus weighs 90 tuns, of which the cylinder, framing, etc., form 75 tuns, the rams and crosshead weighing 15 tuns. It constitutes, as a whole, possibly, the most powerful hydraulic machine ever devoted to manufacturing purposes, and, alike from its magnitude and design, it is well worthy of attention, even if we disregard the object for which it has been specially constructed. Although small tubes could be drawn by this press, it would be sheer waste of power to employ it for such a purpose. It is devoted to the production of hollow shafting, lining tubes for ordnance, etc., and will draw tubes from 3$\frac{1}{2}$ inches to 18 inches in external diameter, an overhead traveler being employed to move such heavy masses of metal. Smaller tubes are drawn by a second apparatus with a single pair of 11-inch rams and a stroke of 10 feet. Heavy flanges cast on the cylinder constituting the die-holders, half a dozen tubes may be drawn at once. —*London Engineer.*

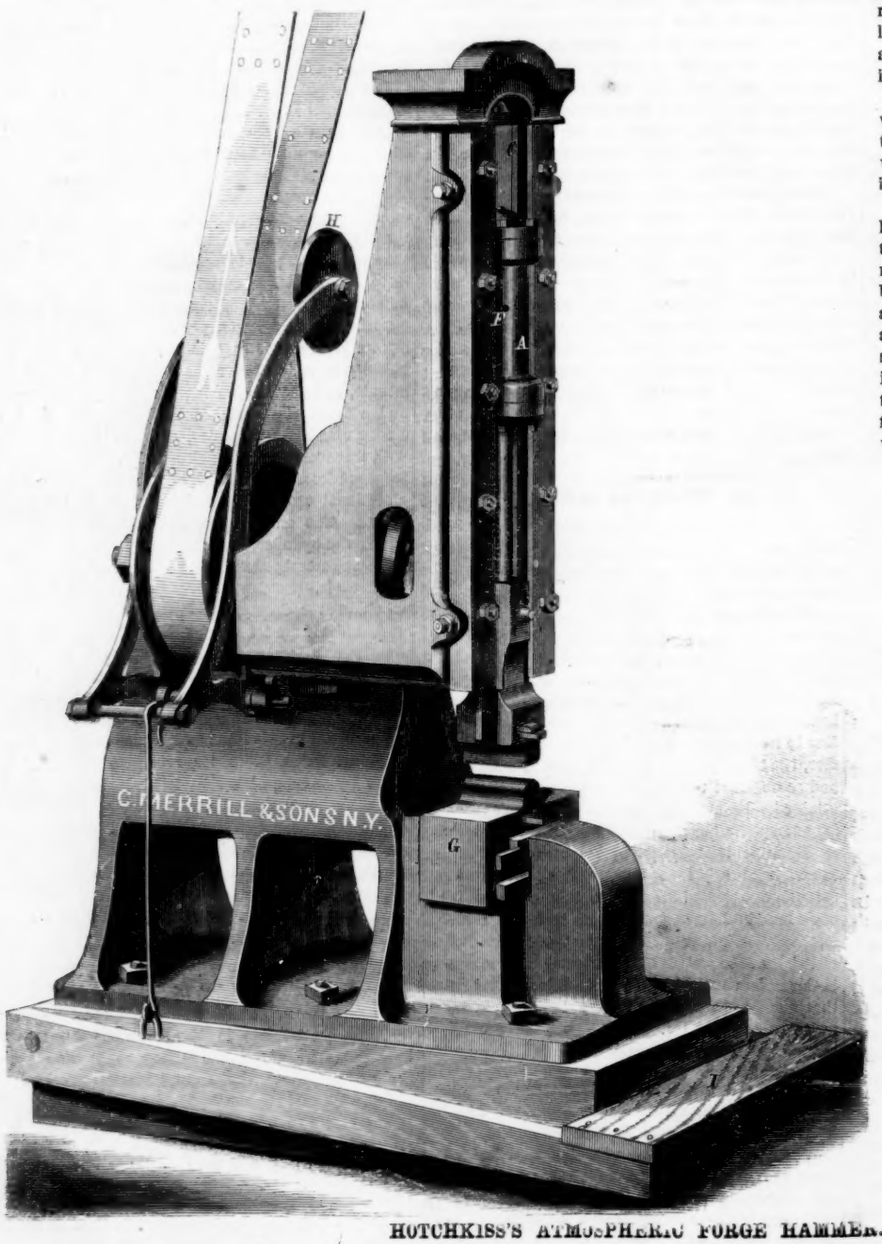
Kangaroo on a Tread Mill.

In our Australian advices we find the following:—"A market gardener in the neighborhood of Portland has put a kangaroo, which he caught and tamed, to various uses. The animal stands nearly 6 feet high. The owner has tested its strength and capabilities in the following manner:—He had a large circle made of slabs an inch thick, with the outside diameter 20 feet, and with an inner one of 17 feet 6 inches. On the circular floor is nailed flat ridges and furrows, thus affording a floor for the kangaroo's feet, and a resting place about 3 feet long for his tail. It is fitted up with simple wheels in the center, like those of a horse chaff-cutting machine, and it is fixed on an incline. The kangaroo is kept fast to a frame work of post and rails, stuffed with hay and bagging, to prevent his legs and back from being bruised. An opening is left in the rear to give his tail full play. By continually springing up he sets the machine in motion. The animal works at about half a horse-power and turns a grinding stone, chaff-cutter, bean mill, turnip cutter, and a washing machine, and all at the same time. This simple contrivance also lifts water separately for irrigating the garden"—Of course it does, and we have no doubt astonishes the natives as well. Why not estimate the power of engines by the nominal kangaroo? It would convey quite as accurate an impression as the nominal horse.—*Engineer.*

Improved Forge Hammer.

This engraving represents a new and improved forge hammer which has met with unparalleled popularity from the manufacturing community. Eighty of them have been sold in the past twenty months, to large and small concerns. They are made 10, 30, 40, 50 and 60 pounds weight. The 40 pound hammer will draw a three-inch bar three feet at one heat. It can be used in any building without injuring the foundation or walls, as it runs light and without noise.

The cylinder and hammer moving in vertical slides, each blow is square, exactly in the same place, and die work can be forged as exact as under



HOTCHKISS'S ATMOSPHERIC FORGE HAMMER.

a drop, and with greater rapidity; it is under the perfect control of the operator, can strike light or heavy, and give any number of blows in quick succession. It will draw, weld or swage in the most perfect manner, and requires less power than any other hammer giving the same blow. The working parts are simple, not liable to get out of order, and are carried in a strong iron frame.

We give a brief outline of its details and operation:—

The hammer derives the increased force of its blow from compressed air. The air is compressed within a cylinder, A, by the piston, B, which fits the cylinder air-tight (see Fig. 2). The cylinder moves in the slides, C, by the action of the connecting rod, D, driven by the fire-plate, E, by belting in the usual manner. The cylinder is air-tight at each end; there are two small holes, F, in the cylinder, through which the air passes freely in and out.

Circulars giving fuller particulars sent on application to Charles Merrill & Son, manufacturers, 556 Grand st., N. Y.

Unmalted and Malted Barley as Food for Stock.

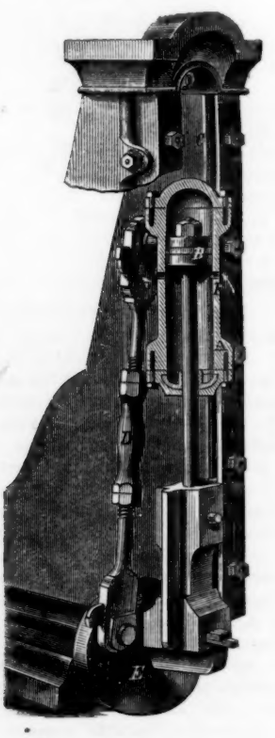
Our readers will remember the excitement and discussions which ended in the abandonment of the duty on malt used for feeding stock. Most of them also will be aware that feeders of stock have not largely availed themselves of the privilege of obtaining duty-free malt under the restrictions prescribed. The reason for this will be found in the admirable and exhaustive report we now notice:—

Report of Experiments Undertaken by Order of the Board of Trade to Determine the Relative Values of Unmalted and Malted Barley as Food for Stock. By JOHN BENNETT LAWES. Presented to both Houses of Parliament by command of her Majesty. 1866.

This is not the first Government report on the relative advantages of malted and unmalted barley as food for cattle. In 1845 and 1846 Drs. T. and R. D. Thomson made a report which was, however, founded on few experiments continued for a very short time, and was necessarily inconclusive. For many reasons, therefore, to ease the mind of the Chancellor of the Exchequer, as well as to procure sound information for agriculturists, it was advisable to have the subject thoroughly investigated, and the Government did the best that was possible in placing the matter in the hands of Mr. Lawes. No doubts can now remain. The experiments were made on such a scale as to allow of arriving at general conclusions. Instead of the two cows and two oxen experimented upon for a few days by Drs. Thomson, Mr. Lawes took lots of ten, and continued the comparative experiments, some for ten and some for twenty weeks, and those conducted with sheep and pigs were on a similar scale. As regards the results of the feeding, we need only give the general conclusion arrived at by the author—"that a given weight of barley is more productive, both of the milk of cows and of the increase of live weight of fattening animals, than the amount of malt and malt dust that would be produced from it." We must add that these results are consistent with those obtained in the limited experiments of Drs. T. and R. D. Thomson, and also agree with those obtained in a previous inquiry by Mr. Lawes himself.

For further information on this part of the subject we must refer the reader to the report, and go back to the account of "the loss and chemical changes which the grain undergoes by malting," which will interest a larger number of our readers.

The preliminary experiments on malting appear to have been executed with the same care, but, unfortunately, the results as stated do not afford us a ready means of comparing them with those obtained by other chemists. On one point, however, they are sufficiently explicit. Dr. Thomson, who has always been considered an authority on this matter, states that the loss of weight which barley undergoes in the process of malting is about eight per cent. In the experiments of Mr. Lawes, however, the loss was found to be very much greater. He states the loss with barley of fair malting quality to amount to as much as nineteen per cent, two-thirds of this loss being moisture, and one-third solid substance. The loss of solid substance consists chiefly of non-nitrogenous matters, but includes also a small amount of nitrogenous and mineral matters. The last consists chiefly of soluble salts removed in the steeping, and it must be added that Mr. Lawes found that some sugar was also removed from the grain by the steeping.—*Chemical News.*



BLEACHING BROOM CORN.—"A broom maker, of Baltimore," writes us that broom corn is bleached by exposing it to the fumes of burning sulphur. A large box is provided, in the bottom of which a pot of brimstone is placed. The corn is then wet and hung up over it so as to expose a large surface, and the whole is covered with a piece of old carpet, to confine the vapor and allow it to escape slowly.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening, April, 5, 1866, the President, Prof. S. D. Tillman, in the chair.

THERMOMETERS AS STEAM GAGES.

Dr. Rowell remarked that some time since he proposed the use of thermometers as steam gages, the relation of the temperature to the pressure of steam having been accurately determined; the pressure could be ascertained with great precision by observing the temperature. Several engineers of his acquaintance had, accordingly, caused thermometers to be fixed in their boilers, but the bulbs very soon cracked to pieces, and the plan was therefore abandoned.

Dr. Parmelee said that the failure of the thermometers was due to the use of American glass in their manufacture. He had used thermometers a great deal, both in the laboratory and in vulcanizing rubber, and he had found that while tubes of American glass would crumble to pieces after use two or three times, bulbs blown from French or Bohemian glass would last seven months.

Professor Everett observed that our glass makers were doubtless able to prodnce good chemical glass, but they did not make the effort on account of the limited demand.

Dr. Feuichtwanger assented to this, and said that in the production of glass for achromatic lenses the American glass makers beat the world.

Dr. Rowell then proposed to reverse his plan; where difficulty is found in using thermometers for measuring temperatures, he would substitute a steam gage, and ascertain the temperature by measuring the pressure. He exhibited a small gage prepared for this purpose, intended especially for use in vulcanizing rubber, and remarked that the index moved over about an inch in ten degrees, while in the small thermometers in general use in vulcanizing, the movement of the mercury is through only one-tenth of an inch in ten degrees.

[It must be remembered that the measurement of the pressure by the temperature, or the measurement of temperature by pressure gage, is only to be trusted in the case of saturated steam. When the steam is superheated the temperature is higher with a given pressure than is given in Regnault's tables for saturated steam.—EDS. SCIENTIFIC AMERICAN.]

THE LOCALITIES OF PETROLEUM.

Professor C. H. Hitchcock, formerly of Amherst College, read a long paper on the geology of petroleum. He followed pretty nearly the same ground which has been repeatedly gone over at the Polytechnic by Dr. Stevens, whose remarks have been very fully reported in our columns A few of his statements, however, may be new to a portion of our readers. He agreed with Dr. Stevens in saying that pretroleum has been found in all the fossiliferous rocks, and that the principal oil-bearing formation in this country is the Devonian. He, however, seemed to regard some of the other formations more promising of a profitable yield than have generally been considered. Among them he mentioned the Triassic, in which petroleum has been found at Simsbury in Connecticut, and the silurian, which has been yielding oil in Cumberland county, Ky., since 1829. Between twenty and thiry years ago a great many wells were sunk in the Western States in search of salt water, and it was in this search that oil was struck in Cumberland county. As the mode of purifying the oil was not then known, it was allowed to run to waste. Since the great value of petroleum has become known, the sinking of wells in this district has been renewed, and some 25 or 30 of these wells are now yielding oil. Professor Hitchcock estimated that at least 75,000 barrels of petroleum has been raised in Cumberland county.

In regard to the disputed point of petroleum being found in California, the speaker said that at least 60,000 gallons have been sent to market in that State.

The formation of petroleum has been much discussed; it is the result mainly of vegetable decomposition, though some of the Canadian and other deposits contain a small quantity of animal matter, as is shown by the presence of sulphur, and by their extremely offensive odors. Except in one case all the water he had found associated with petroleum was salt, and he would suggest that the submergence of vegetation beneath salt water may have been an essential condition of the formation of petroleum.

The yield of petroleum in the United States, for the last five years has been as follows,

1861	24,000,000 gallons.
1862	40,000,000 gallons.
1863	70,000,000 gallons.
1864	87,000,000 gallons.
1865	91,160,000 gallons.

At the present time the product is not less than 14,000 barrels per day.

THE USES OF PEAT.

The President announced peat as the regular subject for the evening. From the long discussion that followed we select for our columns only a portion of the remarks of Mr. Josiah B. Hyde. This gentleman has devoted several years to the examination of peat, and has written some very able papers upon it. He said there are two kinds of peat, the fibrous and the non-fibrous—the fibrous is fit for fuel only, but the non-fibrous has many valuable uses. It is as good for clarifying sugar as bone charcoal.

"Peat cannot be dried by natural means. In this vial is an ounce of it reduced to an impalpable powder. I pour a little into my hand, and blow a cloud of it across this room. I have spread this on porcelain plates and exposed it to the bright sun for hours, and on weighing it, found it to be still just an ounce; but after two hours exposure to a temperature of 212°, it weighed three-fourths of an ounce. On again being exposed to the atmosphere it absorbed moisture and was restored to its original weight."

The subject of peat was continued for the next evening.

THE LENOIR GAS ENGINE.

BY FRED. J. SLADE.

Having had considerable opportunities for observing the practical working of this machine, the writer has thought some of the phenomena of its operation of sufficient interest to be made public. The principle of its action is as follows:—The piston moving at the beginning of its stroke by the momentum previously imparted to the fly-wheel, draws into the cylinder, through a suitable slide valve, a mixture of common illuminating gas and air. When the piston has moved through a little less than half the stroke the valve closes, and an electric spark is introduced into the cylinder and ignites the gases. The expansion caused by the heat of combustion drives the piston during the remainder of the stroke.

The composition of coal gas is not the same in all cases, but varies with the kind of coal used in its manufacture, and the extent to which the distillation is carried. A constitution probably not far from the average in our cities would be expressed by

Olefiant gas	7
Light corburetted hydrogen	56
Hydrogen	21
Carbonic oxide	11
Nitrogen	5
	190

Now, in combustion 1 cubic foot of olefiant gas unites with 3 cubic feet of oxygen and gives 2 cubic feet of carbonic acid and 2 of vapor water. One cubic foot of light carburetted hydrogen unites with 2 cubic feet of oxygen and gives 1 cubic foot of carbonic acid and 2 of vapor of water. One cubic foot of hydrogen unites with one-half a cubic foot of oxygen, and gives 1 cubic foot of vapor of water. One cubic foot of carbonic oxide unites with one-half a cubic foot of oxygen, and gives one cubic foot of carbonic acid.

The result of the combustion of 100 cubic feet of coal gas, therefore, will be represented as follows:—

		Oxygen		Vapor of Water.	Carbonic Acid.
Olefiant gas	7	and 21	yields	14	14
Light carburetted hydrogen	56	and 112	"	56	112
Hydrogen	21	and 10½	"	11	21
Carbonic oxide	11	and 5½	"		
Nitrogen	5		" Nitrogen	5	
	100	149		86	147
Nit. associated with oxy. in air,		560		560	
Original gases		809	yield products of combn,	793	

We see from this that for the perfect combustion of gas of ordinary quality we must supply seven volumes of air for each volume of gas, and that for gases containing a greater proportion of hydro-carbons a greater quantity of air will be required, and, at the same time, the bulk of the products of combustion will be greater.

By applying a Richard's indicator of unusually delicate workmanship the writer obtained from an engine of 8⅜ inches diameter of cylinder, and 16½ inches stroke, diagrams of which the accompanying is a fair specimen.

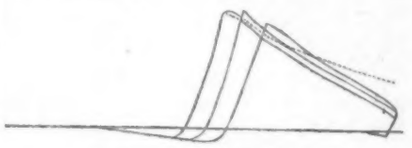


DIAGRAM A—50 REVOLUTIONS.

In this case as the explosion did not occur immediately on the closing of the valve, the tension of the gases falls to 11 lbs. per square inch (above a vacuum). After combustion it rises to 48 lbs. The temperature necessary to produce this pressure is found by the formula,

$$t_2 = \frac{P_2(1+k\ (t_1-32^\circ)\ ) - P_1}{P_1 k} + 32^\circ,$$

in which t_1=temperature of the gases before combustion, taken at 200° on account of the warmth of the cylinder.

P_2 is 48 augmented in the proportion $\frac{8}{7}\frac{2}{8}\frac{3}{3}$ and the mean co-efficient of expansion k of the gases under constant volume is ·00204. This gives us as the temperature of the gases at the moment of combustion, 2474°. The dotted line represents the theoretical curve of expansion, taking into account the loss of heat and consequent fall of pressure due to the work done (which is the proper theoretical curve for an indicator diagram). The temperature at the end of the stroke indicated by this line would be 2156°. The actual final temperature shown by the diagram, supposing there to be no leakage, is 1438°, and the difference, 718°, is the quantity of heat absorbed by the water jacket with which the cylinder is surrounded. It will be observed from this card, that the explosion takes place so late in the stroke that there is a considerable available pressure in the cylinder at the end of the stroke, which, of course, is not utilized. To prevent this waste, the manufacturer of these engines in this country, Mr. Miers Coryell, sets the admission valve so as to close earlier; and this has the further advantage, that at the middle of the stroke a given quantity of work is performed in less time than at the ends, and consequently there is less loss of heat.

The diagrams give information which may be of interest to some as to the time required for the explosion of such a mixture of gases. In this case it appears to be about $\frac{1}{30}$ of a second.

Diagram B was obtained on one occasion when the electrical points in the cylinder were wet, and owing to the uncertain passage of the spark the explosions were very irregular. It is introduced here to show the difference between explosions occuring at the middle of the stroke and those

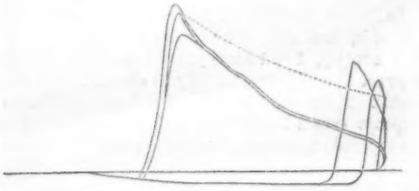


DIAGRAM B—45 REVOLUTIONS. 1 INCH=32lbs.

nearer the ends. It will be observed that the pressure attained in the latter explosions rises somewhat higher than the true expansion curve drawn from the point attained by explosion near the middle of the stroke (which, as for this purpose, there is no work to be taken into consideration, would stand at the end of the stroke 4 2 lbs. higher than that shown).

This is probably due to the greater heat acquired by the gases before explosion. It will also be noticed that the time of acquiring the maximum pressure is considerably greater in the later explosions, being $\frac{1}{30}$ of a second in the earlier and $\frac{1}{30}$ or more in the later.

Lastly, the great loss of pressure by cooling is

strikingly shown—in equal times the lines fall below the hight due to expansion alone by an amount proportionate to the pressure that the gases would have at 32°. In the early explosions in this diagram, the pressure rises from 13 lbs. before explosion to 60 lbs. after, corresponding to a temperature of 3090°. The dotted line represents, as before, the true expansion curve, including the loss of 420° of heat and resulting diminutions of pressure due to the work done.

The construction of these engines is simple, differing in but few particulars from an ordinary horizontal steam engine. The cylinder and heads, as has been intimated, are cast hollow and kept cool by a current of water passing through them. The gas and air are admitted by a slide valve. The gas pipe is connected to a chamber bolted to the cylinder, and between which and the cylinder the slide valve moves. The gas passes through a small port in the back of the valve into the semicircular channel which covers it, and through this up and out of the valve into the atmosphere. It is then drawn down again by the suction of the piston through a number of small holes into the cup of the valve, and thence into the cylinder. This insures its thorough mixture with the air, while, at the same time, it prevents the possibility of explosion, since there is nowhere any explosive mixture except in the cylinder and cup of the valve, the latter being in open communication with the atmosphere.

An air chamber with openings, regulated by a slide, is placed over the holes in the valve to control the admission of air.

A separate valve on the other side of the cylinder is used for the exhaust. As constructed in the French engines this part is a weak point on account of the great heat to which it is subjected from the escaping gases. In the American engines, a small current of water passes through this valve and entirely removes this difficulty.

The spark for igniting the gas is supplied by a Bunsen's battery of one or two cells, and a Ruhmkorff coil giving from 100 to 150 sparks per second, and is distributed to each end of the cylinder.

To most persons it would probably appear that the great heat generated in the cylinder would be destructive of the surfaces. The writer, however, examined an engine that had been running regularly for a month, using in that time less than a quart of oil, and was surprised to find that the bore of the cylinder and the piston rod, though dirty from deposits of impurities, were not even scratched.

The explosion of the gas is unattended by any noise unless the connections are slack. The only size as yet constructed in this country is 4½ inches diameter of cylinder by 8¾ inches stroke, though engines of larger dimensions are in process of construction. A friction dynamometer applied to one of these gave the following result:

Length of lever	4 feet
Weight applied	7 pounds.
Revolutions per minute	185
16,280 foot-pounds per minute=½ horse-power.	

In France there are engines of 3-horse power and upwards, but with the exorbitant prices of gas in this country, 1 or 2 horse-power is probably as high a power as could economically be obtained from this motor. These engines have the advantage that the expense ceases immediately with the work, which is an especial recommendation where the work is intermittent. They can be started and stopped instantly by merely turning the gas cock. They are absolutely free from danger and do not require the attention of an engineer; hence for small powers they are cheaper than steam. On account of their safety, they are admissable in situations where steam would not be.—*Franklin Journal.*

A Curious Experiment.—Into a bell glass full of air a central tube is made to carry a slow current of hydrogen. At the end of the tube, which is carried nearly to the dome of the bell glass, electric sparks are made to pass. The hydrogen is immediately ignited, taking the form of small luminous spheres, which rush about in all directions. After a few seconds there are an infinite number of these little luminous globes, which seem to play at hide and-seek without ever coming into contact.—*Causseries Scientifiques, H. Farville, 1866.*

Correspondence

One View of Perpetual Motion.

Messrs. Editors:—There is a large class of your readers who are interested and benefited by the insertion of such problems as the "razor question," which you have happily disposed of on the correct basis. The writer came to the same conclusion after examining the expansive theory, and also the suggestion that it might be due to the heat of the razor softening the beard in the process of cutting it. Let any person make a lather from hot water, and take the precautions necessary to shave easy, and then experiment by alternately dipping the razor in hot water and cold, several times repeated, at the same shaving, making due allowance for the novel feeling of a cold instrument being applied at such a time, and the result will not be doubtful.

In a back number, you express a doubt as to what is the popular meaning of the term "perpetual motion." Allow one who had the "mania" when he was a boy, but was cured by experiment and reasoning before he was twenty years of age, to give his opinion.

Perpetual motion is a mechanical device, whose movements shall generate sufficient power to continue those movements, *ad infinitum*, allowing for repairs, which are incident to the wear of all machinery. A prominent idea is, that natural laws, gravitation especially, can be circumvented; but thus early I learned that gravitation could not be cheated; that if a pound was raised a foot high by slight effort, that effort must be continued longer, so that what was gained over weight was lost in time—a law of physical science of great and constant usefulness, when fully comprehended.

I have some respect for "perpetual motion" as an educator, especially to many who have not enjoyed the advantages of scientific training. The various phases of the "hobby" stimulate thought and work out a variety of problems, a knowledge of which cannot fail to be of use in after investigations. What is gained in this way is seldom lost, being the result of experience. I am no apologist for a waste of time and talent expended in foolish attempts to produce the "impossible," but to what extent the effort is to be considered a waste is the real question. The knowledge gained, skill in the use of tools, and schemes exploded, which were worthless, and are not to obtrude themselves again upon our attention, are, in individual cases, at least, ample recompense for their cost.

Those visionary theorists who never see the fallacy of one of their pet schemes, are hardly to be reached by reason or ridicule, and if diverted from their "one idea" for a season, are very apt to recur to it again.

Your pungent and happy hits at this class, are felicitously varied, amusing and very enjoyable.

Observer.

The Cascade of Light.

Messrs. Editors:—You rightly explain the phenomenon alluded to in your last issue by your correspondent "Argent." That portion of the illuminating ray which is tangent to the side of the falling stream, or meets it very obliquely, is reflected continuously around its whole circumference, and thus produces the appearance of a luminous point as broad as the jet and as high as the depth of the ray or pencil of light.

Well may you add that "one of the most brilliant experiments ever exhibited in a lecture room is the throwing of the electric light upon (or rather into) a column of falling water." In this case the jet issuing from the side of the containing vessel, its direction on leaving it is horizontal or tangent to the vertex of the parabolic curve which it describes. In the side of the vessel immediately opposite the point of issue of the jet, is a hole of corresponding size, filled in with a piece of glass or a glass lens, through which the rays from the adjoining focus or source of light are transmitted, concentrated on, and thrown into the flowing column of water, in a direction so nearly that of the initial portion of the jet itself, or so obliquely to its surface, as to be totally and continuously reflected from point to point throughout the whole stream, and down to the very basin in which the water is received, thereby giving it the appearance of a cauldron of liquid fire. The stream may be made to assume any hue, as the mere interposition of a piece of colored glass between the light and lens will necessarily give it the appearance of molten iron, gold or silver, or make it assume the aspect of a column of liquid ruby, emerald, or diamond, etc.

This most beautiful experiment was witnessed some five years ago, at the University here, under the able professorship of the Rev. Mr. Hamel, a young physicist of great promise, who explained the phenomenon in the most conclusive manner.

If the containing reservoir be made a hollow column, with water only in the periphery, the light in the center, a series of holes for as many jets on the outside, a corresponding inner series with appropriate lenses, and a rotating rim of variously colored glass, the numerous jets issuing together from the vessel in streams of liquid fire of beautiful and ever-varying hues, produce the most magical and enchanting effect that can well be imagined or described.

Chs. Baillange.

Quebec, C. E, April 5, 1866.

An Experiment with Clean Iron.

Messrs. Editors:—I have noticed in your journal several communications on the subject of cold or unmelted iron floating when placed in melted iron. And on searching for light on the subject, to-day we tried the experiment of placing a piece of cast iron that had been turned clean and smooth, in a ladle of melted iron, when it sunk immediately and did not rise again. Previous to placing the cast iron in the ladle we put a piece of lead in the ladle. The iron sunk as quickly as the lead and with much the same apparent effect on the melted iron. I have therefore come to the conclusion that the reason of unmelted iron floating is not because of the greater specific gravity of melted iron, but that the cause lies somewhere concealed in the coating of sand scale or rust that usually covers the pieces that are thrown in the melted iron as coolers or for experiment. With this clue perhaps you or some of your correspondents may enlighten us.

J. B. Boyce.

Lockport, N. Y., March 28, 1866.

Shaving with a Wooden Razor.

Messrs. Editors:—I read in one of your papers a number of years ago, a receipt for a wash or soap that would soften the beard so that it could be removed with a wooden razor. Now I have all the papers, but cannot seem to find it. Can you inform me what number or volume I can find it in?

A. M. S.

Boston, Mass., April 2, 1866.

[Milk of lime, sulphuret of arsenic, or other depilatory, will soften the beard or hair so that it may be brushed off. These things act on the skin, however, more powerfully than on the hair or beard. A person is not very likely to use them a second time.—Eds.

To Recover Gold from Solutions.

Messrs. Editors:—Please inform me in your Notes and Queries how to recover the gold from a plating solution which was spoiled by adding, direct, a nitro-muriate solution of gold to the common cyanide solution. I have Byrne's "Metal Worker's Assistant," but it does not relieve the quandary.

H. & J.

Paoli, Ind., April 2, 1866.

[The bath is probably not injured. To recover the gold, put a stick of bright zinc into the solution. Zinc will precipitate gold from any solution.—Eds.

Tyler's Safety Switch.

Messrs. Editors:—In your valuable paper of January 20th, I noticed a communication from the *Railway Times*, which highly recommends Tyler's safety switch, and as I desire to adopt it on this road, you would be conferring a great favor by giving me the address of the inventor or manufacturer.

J. S. Murray.

Cienfuegos, Cuba, March 1, 1866.

[We do not know the present address of Mr. Tyler—should this meet his eye, he will please to address Mr. Murray as above.—Eds.

A Perpetual Motion Humbug.

MESSRS. EDITORS :—I have a pendulum in motion whose oscillations are maintained by magnetism induced by the pendulum carrying a helix past the poles of permanent a magnet, at the instant after its reaching the center of oscillation. The magnetic influence is, of course, only momentary, but is sufficient to drive the pendulum beyond its opposite center and thus maintain a constant vibration. Is this perpetual motion ? Is it new to you or your readers ?

J. M. H.

Worcester, Mass., April 5, 1866.

[If we understand the description, the statement is simply incredible. As there is an appreciable, though extremely minute portion of time required to induce magnetism in a helix by a permanent magnet, the pendulum would be drawn backward in its ascent more powerfully than it would be drawn forward in its descent, and thus its motion would be retarded. It would therefore stop sooner in consequence of the presence of the magnet.—EDS.]

New Things in France.

ABORTION.

Encore le goitre. M. Lager announces to the Academy of Sciences that he has produced a number of thyroid enlargements in rats by injecting metallic sulphates under the skin. He has discovered that the use of sulphates will produce abortion, a fact, I believe long known in England, where large doses of sulphate of potash have been employed for the purpose

GRAFTING RATS.

Rats are as plentiful in Paris as London, and they are often the victims of physiological experiments. M. Bert, for example, gained the prize in experimental physiology for removing their tails from their natural position, and grafting them upon all sorts of odd places—the middle of the back of the animal, for instance, and even in the cavity of the peritoneum. M. Bert made one very curious observation. He succeeded in uniting the small end of the tail to the body, and found out that the large extremity, which was free, recovered its sensibility, thus showing that the nerves will convey sensation in a direction inverse to that in which they act under normal circumstances.

SEEING THE INSIDE OF ONE'S OWN EYE.

By the use of endoscopes, laryngoscopes, and ophthalmoscopes the medical man is enabled to get a sight of many things shut out from ordinary view. M. Houdin has added another to these ingenious instruments—the iridoscope—by the aid of which an individual is able to see all that is going on in his own eye. It is simply an opaque shell to cover the eye, pierced in the center with a very small hole. On looking through steadfastly at the sky, or at any diffused light the observer may watch the tears streaming over the globe, and note the dilatation and contraction of the iris, and even see the aqueous humor poured in when the eye is fatigued by a long observation. It is needless to say that with the aid of this instrument a man can easily find out for himself whether he has a cataract or not. If he has he will only see a sort of veil covering the luminous disk, which is seen by a healthy eye. The instrument is certainly simple and curious, and will no doubt excite attention in those who are anxions to know more of themselves. An "iridoscope" may be readily extemporized by making a hole in the bottom of a pill-box with a fine needle.

POISONING BY PHARAOH'S SERPENTS.

We have had here two or three cases of poisoning in young men who have been occupied in making up Pharaoh's serpents. No one had died, but one has been seriously ill.—*Correspondence of the Chemical News.*

PROTECTED LEAD PIPES.

A correspondent writes from Germany that the Water-works of Leipsic have recently been completed, and adds that the leaden pipes employed for house service have been protected by Schwartz and De Wilde's process. Our readers will remember that this is a process for obtaining on the inside of the pipe a coating of sulphide of lead, which is unacted on by water, that attacks lead itself.—*Chemical News.*

English Ironclads.

The following is a list of the ironclads we now possess, either actually in commission or nearly ready for sea, and exclusive of those which, like the *Hercules*, etc., have not long been begun:—

Ship's Name.	Tunnage.	Horse-power	Length.	Beam.	No. of protected guns design'd for	Thickness of Armor	Thickness of Backing.
			Ft.	Ft		Inches.	Inches.
Achilles	6,721	1,250	280	58	26	4½	18
Black Prince	6,109	1,250	380	58	26	4½	18
Warrior	6,109	1,250	380	58	26	4½	18
Agincourt	6,621	1,350	400	59	36	5½	10
Minotaur	6 621	1,350	400	59	36	5½	10
Northumberland	6,621	1,350	400	59	36	5½	10
Hector	4,089	800	280	56	32	4½	18
Valiant	4,063	800	280	56	32	4½	18
Defence	3,770	600	280	54	16	4½	18
Resistance	3,710	600	280	54	16	4½	18
Caledonia	4,125	1,000	273	59	32	4½	Wood ship, side 9½in. thick.
Ocean	4 047	1,000	273	58	32	4½	ditto 29½
Prince Consort	4 045	1 000	273	58	32	4½	ditto 29½
Royal Alfred	4 058	800	273	58	32	6 and 4½	ditto 29½
Royal Oak	4,056	800	273	58	32	4½	ditto 29½
Lord Clyde	4,067	1,000	280	59	34	4½ and 5½ and 6 in	ditto 31½
Lord Warden	4,067	1,000	280	59	34	4½ and 5½ and 6 in	ditto 31½
Zealous	3,716	800	252	59	16	4½	ditto 30½
Bellerophon	4,246	1,000	300	56	12	6	10
Pallas	2,372	600	225	50	5	4½	Wood ship, side 22 in. thick.
Favorite	2 094	400	225	47	5	4½	ditto 16
Research	1,253	200	195	38	4	4½	ditto 19
Enterprise	997	140	186	36	4	4½	ditto 19½
Viper	737	160	160	32	2	4½	10
Vixen	754	160	160	32	2	4½	10
Waterwich	777	167	162	32	2	4½	10
Prince Albert	2,529	500	240	48	6	4½	18
Royal Sovereign	3,765	800	240	63	5	5½	Wood ship, side 36 in. thick.
Scorpion	1 857	350	220	42	4	4½ and 3	9
Wivern	1,857	350	220	42	4	4½ and 3	9

The *Times* publishes this list, which is right, and adds a wish "that the Admiralty would adopt the French system of fastening on the plates with what are termed wood screws instead of through bolts," which is wrong; going on to say that "the latter weaken the plate very considerably and do not hold it on at all, whereas the trials made with the French system of fastening at Shoebury showed it to be so superior to ours as to be literally above any degree of comparison." This passage affords another excellent example of the blunders which people commit when they write about that which they do not understand. It is perfectly true that the wood bolts referred to did not break, and that for the best of all reasons—the wood did not afford sufficient hold to overcome their tenacity, the bolts drew bodily out of the timber, but the destruction of the target was none the less complete because they did not actually break.—*London Engineer.*

Composition of Alloys.

Lead.	Tin.	Bismuth.	Point of Fusion.	Point of Solidification.
120 parts.	140 parts.	120 parts.	130° C.	112° C.
145 "	145 "	100 "	140	129
150 "	150 "	75 "	150	135
150 "	150 "	50 "	160	150
170 "	180 "	35 "	170	163
210 "	190 "	30 "	180	165
140 "	155 "	30 "	190	180
200 "	185 "	30 "	200	180
200 "	180 "	30 "	210	180
240 "	150 "	30 "	220	180
207 "	194 "	30 "	180	180

It is generally to be remarked that the fusion point of an alloy is not in relation to the proportions of the metals which enter into its composition. The alloy of 150 parts of lead, 150 parts of tin, and 50 parts of bismuth (proportions evidently corresponding to 6 atoms of lead, 12 atoms of tin, and 1 atom of bismuth), is one of those which solidify most regularly—that is to say, that no one of the metals entering into its composition crystallizes separately on cooling, and that the alloy remains perfectly homogeneous.

It may be observed that the point of solidification of the last five alloys on this table is constant at 180°. When these alloys are melted and then allowed to cool, small crystals form at 220°, 210° 200°, or 190°, according to their composition, and when the temperature has descended to 180°, the whole mass solidifies. It is noticeable that during the whole time of solidification the temperature remains at 180°, and that the mercury of the thermometer again begins to descend only when every part of the alloy has become solid.

Another alloy remaining very homogeneous, and unvarying in temperature during solidification, is that composed of 207 parts of lead and 294 parts of tin (2 equivalents lead to 5 equivalents tin). This alloy melts as 180°, and solidifies at precisely the same temperature.

In these two alloys, which have the most useful properties, the different metals are united in atomic proportions, which seems to prove that, to obtain a good alloy, it is necessary to take into consideration the atomic weight of the metals composing it. It is beyond a doubt that such alloys, remaining so homogeneous during solidification, are possessed of valuable properties not belonging to other and less homogeneous alloys. This question is certainly of great interest in the manufacture of printing type, and for similar purposes; and deserves to be thoroughly studied.—*Bulletin de la Societe Chimique and Chemical News.*

[It will be observed that the temperatures are given in the centigrade scale. To reduce them to Fahrenheit degrees, multiply by 9, divide by 5, and add 32. In the centigrade thermometer, the interval between the freezing and the boiling point of water, is divided into 100 degrees, and the freezing point is made the zero. Fahrenheit divided the interval into 180 degrees, and made his zero 32 degrees below the freezing point. The proportion of 180 to 100 is the same as that of 9 to 5 —EDS.

The Funnel of the "Bellerophon."

At the recent trial of the *Bellerophon* English ironclad frigate, the boilers steamed freely and the engines were thus enfabled to work up to the required power. The first trial was a failure in this respect, and success was obtained by putting two more courses, 16 feet, to the funnel or smoke stack. This was deemed an unfair proceeding by some, and the following discussion took place in relation to it in Parliament:—

Sir J. Pakington, who had a question on the paper with reference to the lengthening of the funnel of the *Bellerophon* for the purpose of forcing her speed, said that he should be extremely sorry to ask a question which implied a suspicion of anything like unfair conduct without having good reason for so doing. Therefore he felt bound to state that, since he had given notice of the question, he had received information that nothing more was done than was commonly done in other cases with the view to a fair trial of speed.

Lord C. Paget said the answer he had to give was that which he intended if the question had been put, that it was a common practice to lengthen the funnels of vessels with the view to obtain a better draft in the engine room. In the case of the *Bellerophon* the Messrs. Penn had lengthened her funnel without having sought any permission from the Admiralty. And he might mention that the *Warrior*, the right hon. baronet's own ship, had been treated in the same way. (Laughter.)

Air in Wine Tuns.

M. Camille Saint Pierre opened a large wine tun, the air in which would not support the combustion of a candle. As, however, the tun contained some quicklime, it was clear that the effect could not be attributed to carbonic acid. He therefore removed some of the air for analysis, and found it to consist in 100 parts of oxygen 11·85, and nitrogen 85·15. The author remarks that the excess of nitrogen may be attributed to one of two causes—either nitrogen must have been generated or oxygen must have been absorbed. The former hypothesis he rejects and considers it more probable that the walls of the tun, under the influence of moisture, become capable of absorbing oxygen ; and he asks whether this action is due to mycoderms or the oxidation of certain matters soaked into the wood of old tuns.—*Les Mondes.*

THE diving bell has been abandoned on the Thames in favor of the diving bell dress, principally because the men employed were found, while the Westminster Bridge was being built, to spend their time at the bottom in playing cards, and there was of course no effectual means of keeping a check on them. It is not easy to play cards in a diving dress alone, however, and the remedy has proved very satisfactory in its operation.

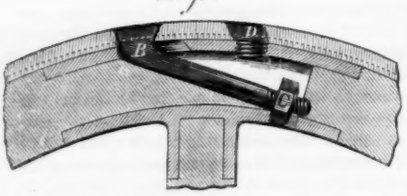
BURGLAR alarms are inquired for by our country readers, and we think that makers of such articles would find it advantageous to keep a short advertisement in the SCIENTIFIC AMERICAN.

CURTIS'S CARRIAGE WHEEL.

Every one who has used a wagon has experienced the inconvenience of wheels shrinking away from their tires. It is practically impossible to make a wheel so that it will not shrink enough to loosen the tires, in dry weather; then the only alternative is to have them reset. This is sometimes done by inexperienced workmen, who err in setting them too tight, for if they are set properly for the dry wheel, they are too tight when the wheel swells, as it does when wet, as in the spring and fall. The result is that the wheel becomes cramped or dished, and loses its strength by being warped out of its natural position. It also runs hard because its center of gravity is outside of its bearing. Now, the only way to obviate this difficulty seems to be to secure the tire to the wheel without welding, so that it may be adjusted to the size of the wheel, whether dry or wet, and preserve the strength of the wheel in all its parts.

Fig. 1

Fig. 2



This object has been effectually accomplished by the device represented in the accompanying engraving. Fig. 1 represents a carriage wheel having two socket pieces, A, of cast or malleable iron, forming part of the rim at opposite sides of the wheel, into which is tennoned both ends of the felly and a spoke, thus forming a superior fastening for bent rims as well as the device for securing the tire. Fig. 2 represents one of the socket pieces cut through the center so as to show its working parts. B is a hook-headed bolt passing through the socket piece at an acute angle with the tire, and on which there is a nut at C, with a slot in the socket casting to allow it to turn. D is a wrought-iron stud screwed into the casting and stationary there; the socket piece in the opposite side of the rim is the same with the exception of the stud, D.

In putting on the tire it is first hooked on to the stud, then passed round the wheel and hooked on to the bolt in the opposite socket piece; thus half of the tire is tightened. It is then passed round and the end hooked on to the bolt. These two bolts secure and fasten the tire so that it may be adjusted to the size of the wheel, whether wet or dry.

Persons desiring an interest in this patent should address the inventor and patentee, Andrew J. Curtis, West Winterport, Maine, by whom it was patented Jan. 2, 1866.

PROGRESS OF SCIENTIFIC EDUCATION.

We are indebted to the author, S. Edward Warren, C. E., Professor of Descriptive Geometry, etc., in the Rensselaer Polytechnic Institute, for a neat pamphlet describing the polytechnic schools and scientific department of colleges in the United States, that are devoted to the teaching of science. The number of these is twenty-three, and the statement of the dates at which they were severally formed exhibited very forcibly the rapid change that is taking place in the public estimation of the comparative importance of classical and scientific learning. The first was founded in 1824, the next in 1845, and all but four have been founded since 1850.

The pamphlet is published by John Wiley & Son, 535 Broadway.

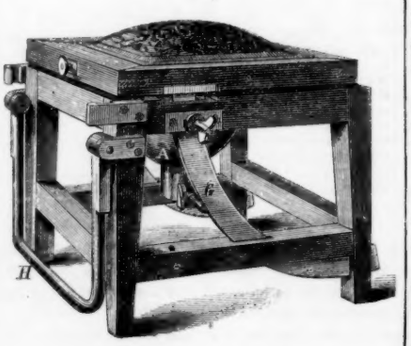
RAINEY'S NURSERY CHAIR.

These engravings illustrate a new nursery chair for the use of children. It is so designed as to be capable of folding up in a small compass and packed in a box, and thus easily carried when traveling, either in cars or on steamboats. The principal parts

Fig. 1

consist of a metallic chamber, A, fixed in a frame, B. This frame is provided with a hinged lid, C, which has a movable center, D, one side of which is padded, as shown in Fig. 2, and the other furnished with a a cover, E, fitting the chamber, A. In order to make the points of contact perfectly air-tight, an elastic ring of rubber is let into the top, as at F.

Fig. 2



The center of the lid is capable of turning on pivots so as to bring the padded portion inside, in order that the occupant of the seat may have a comfortable support and not be brought in contact with the cover, E. At each side of the lid there are arms, G, which are curved to conform to the motion of the lid on its hinges. These, in connection with the fender or guard, H, in front, insure the child against injury from falling, so that it may be safely left to itself. The guard, H, is easily turned up or down as in Fig. 2, to remove or place the child in, and a faucet is fixed in the bottom of the chamber, A, for an obvious purpose. Various styles of this piece of furniture can be made so that its office is entirely hidden. It was patented by the Scientific American Patent Agency, on Nov. 28th, 1865. For further information address S. Rainey care of Aiken & Rainey, 60 Carondelet street, New Orleans, La.

A PAYING INVESTMENT.

Probably there are few newspapers in the world that receive a more careful scrutiny from readers than the Scientific American. It is a sort of standard reference upon all matters relating to the mechanical and manufacturing interests of the day, and its value as an advertising medium for those branches of industry is remarkable.

We are forcibly reminded of this fact by the appearance, in another column, of the engraving of "Hotchkiss's Atmospheric Hammer," the makers of which, Messrs. Merrill & Son, inform us that they have received orders amounting to *twenty-five thousand dollars* traceable directly to advertising, for the past few months, in the Scientific American; while other orders, received indirectly through our paper, amount to fifteen thousand dollars more—making forty thousand dollars in all.

We believe that manufacturers of improved machinery of every sort, will find it greatly to their advantage to keep constant advertisements in the Scientific American. From all parts of the country—north, south, east, and west—we receive inquiries for the best machinery. We cannot do otherwise than refer applicants to our advertising columns.

THE CHOLERA.

The arrival of the steamship *England* at Halifax, Nova Scotia, with a large number of cholera cases on board, has re-awakened the fears of the community, and the disease is the topic of the hour.

Medical writers say that mental disquietude, such as fear or apprehension incites, renders persons more liable to be attacked, and it is therefore to be regretted that the daily papers see fit to give sensational headings, and publish articles which cause unnecessary alarm. If the disease is infectious its ravages will not be stayed by exciting a panic in regard to it, and many unreflecting persons will aid in its extension by alarming reports that have not the least foundation. A calm, equable, mental condition, absolute cleanliness, both in person and apparel worn next the skin, wholesome food at regular intervals, and absence of anything like fear, are laid down by physicians as the best preventives of cholera.

Since the above was written it has transpired that the disease was not the cholera, but we believe our suggestions are not untimely.

SPECIAL NOTICES.

William O. Grover and William E. Baker, Boston, Mass., have petitioned for the extension of a patent granted to them on the 22d day of June, 1852, for an improvement in sewing machines.

Parties wishing to oppose the above extension must appear and show cause on the 4th day of June next, at 12 o'clock, M., when the petition will be heard.

Allen B. Wilson, of Waterbury, Conn., has petitioned for the extension of a patent granted to him on the 15th day of June, 1852, for an improvement in sewing machines.

Parties wishing to oppose the above extension must appear and show cause on the 28th day of May next, at 12 o'clock, M., when the petition will be heard.

Asahel G. Batcheider, of Lowell, Mass, and Geo. O. Way, of Claremont, Minn, administrators of the estate of Lafayette F. Thompson, deceased, have petitioned for the extension of a patent granted to the said Batchelder and Thompson on the 6th day of July, 1852, for an improvement in railroad car brakes.

Parties wishing to oppose the above extension must appear and show cause on the 6th day of July next, at 12 o'clock, M., when the petition will be heard.

Treatment of Cholera.—Dr. Hall, in an elaborate article in his *Journal of Health*, on cholera and its treatment, takes the ground that calomel is the only proper remedy, and that to employ any other is to trifle with human life. Dr. Scott, in a long article on the same subject, published in the *University Journal of Health*, says: "It cannot be denied that great fatality attends the treatment of cholera by calomel." Who shall decide when doctors disagree?

THE

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☞ "The American News Company," Agents, 121 Nassau street, New York.

VOL. XIV., No. 17. [NEW SERIES.]. *Twenty-first Year.*

NEW YORK, SATURDAY, APRIL 21, 1866.

Contents:

(Illustrations are indicated by an asterisk.)

SUPPLEMENTAL SHEET.

With the present number we issue a supplemental sheet of four extra pages, which contains the official list of patent claims.

The pressure upon our columns has been so great during the past six months, that we have been embarrassed for space in which to meet the demands of our numerous advertising patrons, without seriously curtailing our reading matter. The SCIENTIFIC AMERICAN having ten-fold more readers than any similar journal now published, advertisers find that an investment in its columns returns a large profit.

Not wishing to disappoint our generous patrons in any respect, we intend in future to issue supplements whenever, in our judgment, the advertisements and patent claims are likely to trench upon the space that we consider due to our readers.

EXHIBITION OF A NEW ELECTRO-MAGNETIC MOTOR.

In the afternoon of Friday, April 6th, a number of gentlemen met at the lecture room of the Free Academy, in this city, at the invitation of Professor R. Ogden Doremus, to witness the operation of a new electro-magnetic machine, the invention of Mr. L. C. Stewart.

Most of our readers doubtless understand the principle of electro-magnetic machines. They all depend on the power which a current of electricity has to induce magnetism, either in a bar of iron, or in a hollow helix where no iron is present. If a piece of wire is insulated, by covering it with silk, cotton, or other non-conducting material, and it is then wound around a rod of soft iron, so long as a current of electricity is passing through the wire the rod of iron is a magnet, and so soon as the electric current stops, the iron ceases to be magnetic.

The simplest form of an electro-magnetic machine is a lump or bar of iron secured to one end of a vibrating lever, directly over the poles of an electro-magnet. The helical wire of the magnet being connected with a galvanic battery, the soft iron core becomes a magnet, and pulls the iron bar on the lever down; this movement opens a gap in the helical wire and breaks the current, when the bar ceases to be attracted, and it is lifted up by the motion of a fly wheel connected with the opposite end of the vibrating lever. This movement of the lever closes the gap in the helical wire, restoring the current and renewing the magnetism, when the bar is again drawn down. Thus the current is automatically broken and closed by the action of the machine, and the vibrations are made perpetual.

It long since occurred to many mechanicians that much greater velocity could be attained by securing several bars of iron to the periphery of a rotating wheel, and fastening a series of electro-magnets around the inner side of a fixed circumscribing wheel or concave. Mr. Stewart's machine is a modification of this plan, his improvement consisting mainly in the method of breaking and closing the circuit. This is effected by two brass wheels running with their peripheries in contact—shallow depressions being sunk in the peripheries so that the wheels do not touch each other while passing these depressions.

Mr. Stewart said that with one of his engines, with a helical wire 8 miles in length, he had reversed the current 80,000 times in a minute!

One of the advantages that is claimed for this engine is that sparks are avoided in breaking the current, and thus the combustion of the brass is prevented. Mr. Stewart stated that where sparks are produced it is necessary to employ platinum, gold, or some other of the noble metals.

Professor Doremus remarked that he must go a little further than Mr. Stewart. With the powerful battery belonging to the Free Academy platinum was not merely melted, it was volatilized; and even the natural alloy which is used for tipping the points of gold pens, irridosmium, they had melted and run together in larger masses, thus increasing its value.

So far the obstacle to the employment of galvanic electricity as a motor is the high cost of the power. The power is obtained by oxidizing zinc, which is worth thirteen cents per pound, while in the steam engine the power is obtained by oxidizing coal, which is worth half a cent per pound. It is true that in the steam engine not more than one-tenth of the power generated in the furnace is utilized; but all the investigations indicate that thus far in the electro-magnetic machine, the proportion is still smaller.

EXPLOSION OF A PETROLEUM LAMP.

We had an accident at our house last night, but fortunately it did no damage except to scare the children. It was this: Our coal oil lamp exploded with but little warning; the burner, chimney and wick blew out with so much force that it struck the ceiling some six feet above the lamp. The plaster of paris that the burner was fastened in with was all blown out also. Now I want to know the cause of this thing. We have been using coal oil for four or five years without any accident before, and we often leave the lamp burning all night, which I will be afraid to do again unless I know the cause. We bought our oil of a druggist, and supposed that it was good, and I still think it was. Please answer through that valuable paper, the SCIENTIFIC AMERICAN, which I think the best paper in the world, and oblige your friend and subscriber,

SAMUEL LUTHY.

Carrollton, Ill., 1866.

Our access of new subscribers is so rapid that we are obliged to repeat explanations of familiar phenomena, in order to give satisfaction to the largest number of our readers.

The two elements, carbon and hydrogen, combine in a great number of different proportions, forming as many different substances. These hydro-carbons have some properties in common, while they differ in others. For instance, they are all combustible, but they differ widely in their fluidity and volatility. At ordinary temperatures some are solid, as paraffine, and others are gaseous, as olefiant and marsh gas, which constitute the principal proportion of illuminating gas, while between the solids and gases in volatility are a large number of liquid hydro-carbons that boil or evaporate at different temperatures. Petroleum is a mixture of liquid hydro-carbons, usually holding also in solution both gaseous and solid hydro-carbons.

When explosions of petroleum occur, they are produced in this way. The oil is in a tight room or vessel, which prevents the gaseous and volatile hydro-carbons of its constitution from passing away as they escape from the liquid, but confines them together with the atmosphere of the room or vessel. After a sufficient quantity of the combustible vapor or gas is mingled with the air, if fire is applied to the mixture, each atom of hydrogen in the hydro-carbon enters into combination with an atom of oxygen to form a molecule of water or steam, and each atom of carbon enters into combination with two atoms of oxygen to form a molecule of carbonic acid. In other words, the petroleum vapor is instantaneously burned. The heat generated by this rapid burning causes so sudden an expansion of the carbonic acid and steam, which are the products of combustion, as to produce the effects of explosion.

The more volatile portions of petroleum are separated from the illuminating oil, in the process of refining, and are sold as naptha. We have heard dealers charged with mixing this naptha with illuminating oil, in order to sell it at a higher price, and it is possible that our correspondent's oil had been thus adulterated. It may be, however, that the explosion was due to a different cause. When the wick of a petroleum lamp is turned down very low, the oil will ascend and be evaporated more rapidly than it will burn, filling the room with the odor of petroleum, a fact that, probably, most people have observed who are in the practice of burning petroleum. At all events there can be no doubt that, in some way, the upper portion of our correspondent's lamp became filled with a mixture of atmospheric air and the vapor of petroleum, and then this explosive mixture was set on fire.

THE MIDLAND STEAM BOILER INSURANCE CO.

This is the title of a new company, recently organized in England to inspect and insure steam boilers against explosion. They had, at the last report, no less than 1,839 steam boilers under their care, and of these but one had exploded—being the first accident that happened in four years, and this one the proprietors had been repeatedly warned of, but disregarded the warning. During the year, 605 reports have been sent in to owners, and 7,172 inspections have been made, showing that each boiler was inspected every three months.

There were 55 boiler explosions in England in 1865, attended with great destruction of property and loss of life. "Great efforts," says the engineer, in his report, "have been made to obtain the facts in the cases, as they generally show some simple cause, and the utter fallacy of the 'mysterious' theories so popular among those who have only partially considered the subject."

Some of the causes of disaster are mentioned, and being exceedingly interesting to engineers and others, we republish them in a condensed form.

Many old boilers have been removed and replaced by new ones of better construction; explosions of the past year, showing that boilers which have been used for twenty years should be worked with great caution. Many cylinder boilers have been burnt by short water—arising in one case from a chip under the check valve—from the uncertainty of a float indicator where water boils violently, and to the want of back valves to prevent the water being forced out of one boiler into another. Several cases occurred where scale had become detached from the sides of the boiler, fallen to the bottom and there burnt fast; and very great injury has been done to boilers by emptying them under pressure and immediately filling them with cold water.

Many safety valves have been found habitually overloaded. When they leak, instead of grinding them tight, the engineer, or others, put on extra weight, and the want of repair was forgotten. Boilers used without gages, the proprietors depending on the calculated weight on the safety valve, are often found working at much higher pressures than were suspected. Pressure gages are frequently found out of order, one registering as much as 40 pounds out of the way. The most dangerous defects were found in cylinder boilers, and, curiously enough, where the inspectors were assured by the attendants that all was in perfect order. Around the brick work, even though the boiler was entirely separated from it, most dangerous corrosion occurred, and this even in new boilers. One singular case was where a sprung rivet had caused several jets of steam to play on the plates, which by long continuance had cut channels almost through. These defects were dis-

covered by the vigilance of the inspectors, and undoubtedly saved much property and many lives. They are as common in American as in English boilers, but are suffered to pass unattended to until explosion occurs.

The London *Mechanics' Magazine* reproaches us in a late issue for publishing a long account of boiler explosions without comment, saying that life is held so cheap in this country that hundreds may be killed through accidents by steam without especial notice. It would take a larger paper than the SCIENTIFIC AMERICAN to record and comment on all the boiler explosions in the United States, and the mere publication of them would do no good.

We have no such admirable concerns as these English boiler insurance companies, but we hope to before long, and in the meanwhile, let every engineer be his own assurer.

NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

A NEW SODA PROCESS.

A process for obtaining soda from common salt, which, if it should prove successful in practice on the great scale, will be an even greater advance upon the method by which what Dr. Hoffman has well called "the most valuable of all known transformations" is at present effected, than in the Bessemer process upon all previous methods of converting iron into steel, has just been patented by Mr. Walter Weldon. At present, the manufacture of "soda crystals" involves six distinct operations, requiring very extensive and costly plant, and a very large amount of both labor and fuel, besides rather more than an equivalent of that costly reagent, sulphuric acid. The first of these six operations consists in causing sulphuric acid to react upon salt at a high temperature, whereby sulphate of sodium is formed, hydrochloric acid flying off as vapor, and being condensed by means of towers filled with pieces of coke over which water is kept constantly trickling. The hydrochloric acid gas enters at the bottom of these towers, and in its way upward comes into contact with so large a surface of water as to be completely absorbed thereby, forming the aqueous solution of hydrochloric acid which is known in commerce as "muriatic acid," or "spirits of salts." The second operation consists in calcining the sulphate of sodium produced by the first operation with coal and lime, in what are called "balling furnaces," the result being the compound known as "black ash," and usually containing about 24 per cent of carbonate of sodium, 12 per cent of hydrate of sodium, or caustic soda, 2½ per cent of undecomposed salt, 2 per cent of undecomposed sulphate of sodium, and 59 or 60 per cent of "soda waste," consisting mainly of a mixture of oxysulphide of calcium with carbonate of the same base. The third operation consists in carefully lixiviating the "black ash," so as to separate its soluble constituents from its insoluble ones, the results being a solution of mixed hydrate and carbonate of sodium, and that insoluble residue which accumulates in such enormous quantities in the neighborhood of every alkali works, occupying valuable space, and giving off most offensive gases into the atmosphere. The fourth operation consists in boiling down to dryness the solution of mixed hydrate and carbonate of sodium, and the fifth in calcining the resulting "soda ash" with sawdust, in order to convert all the hydrate in it into carbonate. The sixth and last operation consists in dissolving the product as the fifth operation in water, and leaving the solution to stand until the carbonate of sodium in it crystallizes out. When a very pure product is required, the crystals first obtained are again dissolved, and the solution so obtained is left to crystallize as before. These six operations occupy altogether about a fortnight, and if the soda is wanted as bicarbonate, a seventh operation has to be performed, which occupies several days more. By Mr. Weldon's process, however, it is said that a large charge of salt may be converted into bicarbonate of sodium by a single operation, which may be performed in twelve minutes, and this, too, without the use of sulphuric acid, or of anything whatever that is not used over again, except coal, and without the production of a single ounce of any kind of "waste." Mr. Weldon's process is said to consist simply in placing within a suitable vessel, capable of withstanding a moderate amount of internal pressure, an equivalent of magnesia and an equivalent of chloride of sodium, or common salt, together with a small quantity of water, and then pumping in carbonic acid gas, obtained by blowing air through a coal fire. The result is said to be that the carbonic acid converts the magnesia into bicarbonate of magnesium, which can only exist in solution, and that this compound, as fast as it is formed, decomposes an equivalent of the chloride of sodium, forming chloride of magnesium, which is exceedingly soluble, and so remains in solution, and bicarbonate of sodium, which is much less soluble, and therefore falls to the bottom. Bicarbonate of sodium is thus obtained at one operation, extending over less than a quarter of an hour, and without the aid of any more costly reagent than can be obtained by the mere combustion of coal. The bicarbonate thus obtained can be converted into neutral carbonate by the application of a very moderate amount of heat, under the influence of which the bicarbonate gives off one equivalent of carbonic acid, which can of course be used over again. The solution of chloride of magnesium is evaporated to dryness, and the residue then heated to a little below redness, when the hydrochloric acid is all driven off, to be condensed in the usual way, and magnesia is left behind, ready for use over again. The magnesia used in the process thus costs nothing after the first time, and the only materials consumed are salt and coal. It is said that by this process soda may be produced at virtually no cost whatever, the value of the hydrochloric acid obtained exceeding the raw material, fuel, labor, wear and tear, and interest on capital. The quantity of soda now manufactured in this country annually is equivalent to about 700,000 tons of "soda-crystals," the present value of which is about £7 per ton. It follows that Mr. Weldon's process, if it should prove successful on the great scale, would save to this country alone, on its present consumption of soda, something like five millions sterling a year.

BURNING MAGNESIUM IN STEAM.

MM. Deville and Caron have found that magnesium will burn brilliantly in an atmosphere of *steam*. They passed steam through a tube containing magnesium, heated by the flame of a spirit lamp. The magnesium burnt vividly, liberating hydrogen. They tried the same experiment with zinc, and succeeded in making that metal also burn in an atmosphere of steam, but the temperature required was of course very much higher than in the case of magnesium. MM. Deville and Caron have also found that the presence of the feeblest acid will enable magnesium to decompose water, even in the cold. Water containing carbonic acid is decomposed by magnesium with great rapidity.

IMPROVED PROCESS OF SEPARATING SILVER FROM LEAD.

Pattinson's well-known process for separating lead from silver has recently been improved upon on the continent. After having been melted the lead is run into a crystallizing pan, and its surface covered with finely broken coke, upon which a stream of water plays. The mass of metal then receives a circular motion from an agitator, by which the whole is equally moistened and cooled. A crust forms on the top of the mass in about an hour, which encases the fragments of coke. The water is then turned off, the agitation stopped, and the unsolidified lead holding the silver, drawn off from the bottom of the crystallizing pan.

NEW METHOD OF MAKING ICE.

A new method of making ice has been devised by Signor Toselli, who uses a machine, adapted for household purposes, in which compressed steam replaces the ammonia or other agents in ordinary use. The machine consists of two cylinders, in one of which a solution of common salt is placed and heated. When the temperature of the saline solution reaches about 100 deg., the steam is passed into the second cylinder; after evaporating for an hour the connection between the two cylinders is broken, and the one containing the compressed steam is placed in a vessel of cold water.

A SINGULAR OVERSIGHT OF SEVERAL PHILOSOPHERS.

In his recent lecture on "The Relations of Radiant Heat to Chemical Constitution, Color, and Texture," delivered at the Royal Institution and since published in the *Fortnightly Review*, Professor Tyndall gives a curious instance of how small an oversight may entirely destroy the value of otherwise very careful researches, and of "what extreme caution," to use his own phrase, "is essential in the operations of experimental philosophy." Long before he had proved, as he has since done so completely, by varied and most conclusive experiments, that the fact actually is so, Professor Tyndall was convinced that what had already been established, in relation to the phenomena of radiation and absorption, with respect to gases and vapors and the liquids from which vapors are derived—namely that "the acts of radiation and absorption are molecular, depending upon chemical and not upon mechanical conditions,"—must necessarily be true also of solids. At the threshold, however, of the researches which he determined to undertake in order to test the soundness of this conviction, he was met by a multitude of facts, obtained by celebrated experimenters, which seemed, at first blush, quite conclusive the other way. Melloni, for example, had found that lampblack and chalk each exhibited precisely the same amount of radiant and absorbent power, and MM. Masson and Courtepee had performed a most elaborate series of experiments on chemical precipitates of various kinds, the results of which went to show that all such bodies possess exactly the same degree of radiative and absorptive energy, and led the experimenters to the conclusion that "where bodies are reduced to an extremely fine state of division, the influence of this state is so powerful as entirely to mask and override whatever influence may be due to chemical constitution." A host of other inquirers had arrived at similar results, but they had all committed a little oversight which utterly vitiated their work. The nature of that oversight Professor Tyndall thus explained:—"I have here," he said, "a metal cube with two of its sides brightly polished. I fill the cube with boiling water and determine the quantity of heat emitted by the two bright surfaces. One of them far transcends the other as a radiator of heat. Both surfaces appear to be metallic. What then, is the cause of the observed difference in their radiative power? Simply this. I have coated one of the surfaces with transparent gum, through which, of course, is seen the metallic luster behind. Now this varnish, though so perfectly transparent to luminous rays, is as opaque as pitch or lampblack to non-luminous ones. It is a powerful emitter of dark rays; it is also a powerful absorber. While, therefore, at the present moment it is copiously pouring forth radiant heat, it does not allow a single ray from the metal behind to pass through it. The varnish, then, and not the metal, is the real radiator. Now, Melloni, Masson, and Courtepee experimented thus: they mixed their powders and precipitates with gum water, and laid them by means of a brush upon the surfaces of a cube like this. True, they saw their red powders red, their white ones white, and their black ones black, but they saw these colors through the coat of varnish which encircled every particle of their powders. When, therefore, they concluded that color had no influence on radiation, no chance had been given to it of asserting its influence; when it was found that all chemical precipitates radiated alike, it was the radiation from a varnish common to them all which showed the observed constancy." In order to show still more conclusively that the case is really thus, Professor Tyndall performed the following further experiment: He took two powders of the same physical appearance, one of them being a compound of mercury and the other a compound of lead. He spread these powders, without varnish of any kind, one on one surface and the other on another surface of such a cube as that used in the experiment already quoted. Filling the cube with boiling water, and determining the amount of the radiation from the two surfaces respectively, he found that the surface covered with one powder emitted only thirty-nine rays while that covered by the other powder emitted seventy-four. He then took a second cube, having two of its surfaces coated with the same powders, but in this instance by the aid of a transparent gum. The radiative power of the surface coated with the one powder was now absolutely the same as that of the surface coated with the other

IMPROVEMENT IN PREPARING CITRIC ACID.

Citric acid, of which the consumption in this country is now very large, is imported chiefly from Sicily, and usually reaches this country as a black fluid, in appearance closely resembling a thin treacle. This black fluid is obtained by inspissating the juice procured by subjecting lemons to pressure, after the rinds of the lemons have been removed, for the sake of their essential oil. The first process to which this black juice is subjected, by the manufacturers here, is that of treatment with chalk, whereby an insoluble citrate of lime is obtained. This citrate of lime, after having been well washed with cold water, is decomposed by sulphuric acid, insoluble sulphate of lime being thus formed and citric acid passing into solution. At this stage the citric acid is still associated with a considerable quantity of coloring matter, of which citric acid is perhaps more tenacious than any other vegetable acid, and accordingly the next step is to remove as much of this as possible by means of animal charcoal. The solution is then evaporated, until, on cooling, it will crystallize. The crystals it then yields are by no means free from coloring matter, but are of a decided brown color, and are therefore re-dissolved, and their solution treated again with animal charcoal, evaporation and crystallization being then repeated as before. Such is the process by which citric acid is usually manufactured; but M. Perret, as has already been announced in these columns, is trying to introduce a process, the first stage of which would be the combination of the citric acid in the lemon juice with magnesia, instead of with lime. The *Bulletin de la Societe Chimique*, of Paris, has just given a detailed account of M. Perret's proposals, the main object of which is to avoid the great loss which so frequently occurs by reason of the inspissated lemon juice becoming so altered, during its transit from Sicily to England, as to be completely spoilt. This liability of the inspissated juice to spontaneous alteration is shared by citrate of lime, and hence no advantage has been found to attend the plan, which has been many times tried, of treating the lemon juice with lime in Sicily, and so bringing the citric acid to this country, not as inspissated lemon juice, but as the compound which is first formed in the usual process for converting the crude into the commercial acid. M. Perret finds, however, that, by treating lemon juice with magnesia, compounds are obtained which are almost absolutely unalterable, resisting heat and moisture for a very long time without suffering the least injury. He therefore proposes that the lemon juice, immediately on its having been expressed, shall be treated on the spot, with an excess of magnesia—which earth, in the form of carbonate, quite pure enough for use for this purpose, is very abundant in Italy. There is thus formed a perfectly insoluble tri-basic citrate of magnesia, in the form of a very dense granular powder, and if this compound be added to a fresh quantity of lemon juice, heated nearly to the boiling point, there is obtained a solution of bi-basic citrate of magnesia, which, on cooling, yields crystals almost absolutely pure. This bi-basic citrate is of course the most suitable for transport, and will probably before very long be the only form in which we shall import citric acid.

CURIOSITIES OF SOAP BUBBLES.

Mr. J. Broughton, B. Sc., chemical assistant at the Royal Institution, has contributed to the March number of the *Philosophical Magazine*, an account of some very curious optical appearances observed by him in the remarkably permanent soap bubbles which M. Plateau some time ago taught us how to produce by means of a solution of one part of pure oleate of soda in fifty parts of distilled water, mixed with two-thirds of its bulk of pure glycerine. Mr. Broughton states that a bubble blown with this solution and placed on a wire ring under a glass case will frequently, after standing for an hour, exhibit at its upper pole a circular black spot, one third of an inch in diameter. The black is intense, but it always possesses the property of reflecting a small amount of light. In this position it can easily be examined by means of a lens, which renders visible optical effects of great splendor and interest, and reveals that the film is incessantly in motion. This discovery led Mr. Broughton to devise a simple arrangement for examining a small bubble by means of a powerful compound microscope, the bubble being strongly illuminated by a good condenser, so that the light, after a reflection, might pass through the microscope. With this arrangement he found the film of the bubble to exhibit optical phenomena of the utmost magnificence. The appearances observed in and near the black spot above described were, he says, "of especial splendor. On the black ground moved specks of brilliant yellow and orange, which again contain smaller spots of blue and black, of almost every geometrical form, but always in rapid motion. Many other appearances were observed; among the most common being spots of such regularity that at first sight they produce the effect of structure. Under a high power, these latter were resolved into series of Newton's rings of excessive minuteness. The variety of the phenomena was quite remarkable: but the most commonly occurring effects were those in which the colors red and green prevailed. The motion appeared to be invariable and incessant." Mr. Broughton calculated that the thickness of the film, in the part at which the appearance of a black spot was presented, amounted to about three eight-millionths of an inch.—*Mechanics' Magazine.*.

Cast Steel--Magnesian Crucibles.

SIR:—Last month M. Boussingault presented a note of M. H. Caron to the Academy of Sciences on the air bubbles and blisters in steel, and in which he stated that cast steels in general, and particularly those which are termed in commerce soft, because the tempering modifies very little their hardness, are subject to contain bubbles. In order to avoid these, or at least to lessen the number and dimensions, the general practice is, as soon as the jet is run, to weigh the ingot with a piece of cast iron, fitting exactly into the ingot mold. The effect of this piece is to cool the surface in fusion which it touches, and thereby prevent the gases from escaping, and producing numerous cavities, which would deteriorate the value of the steel cast without this precaution.

These blisters are of two kinds. One sort, with metallic and iron-colored luster inside, seem to have been produced by a gas incapable of oxydizing the metal; this is the most numerous. The other presenting to the eye the varied colors of iron or of steel heated in the presence of an oxydizing gas, is much more seldom met with than the first, and is only met with at the surface of the ingots. It is certain that hydrogen, carbonic oxide gas, nitrogen, or a mixture of these gases, are the only possible causes of these blisters. Have these gases originated from the atmosphere of the furnace? or have they been absorbed in nature by the metal in fusion? If they do not proceed directly, and without transformation, from the ambient gases, how and why does it happen that they are developed just at the moment of the solidification of the metal? Lastly, how are these bubbles to be avoided? Such are the questions which M. Caron proposed to himself, the answers to which he has endeavored to furnish by direct experiment.

Steel, cast in a crucible of refractory earthenware, and left to cool slowly, is always full of cavities lined with crystals; often, even, when the gases of the furnace have penetrated in sufficient quantity into the crucible, the ingot is found to be surmounted by a metallic and cavernous efflorescence, occupying a considerable volume. This is never seen in the case of iron.

These two fusions of steel and of iron having been made under the same circumstances, the two metals have had to be exposed to the influence of the same gases composing the atmosphere of the furnace. There are, therefore, only two hypotheses now possible:—1. That the direct absorption of the hydrogen and carbonic oxide gas of the furnace by the metal in fusion may lead us to suppose that steel possesses the property of absorbing these gases, and that iron does not. 2. That, not admitting this direct absorption as demonstrated satisfactorily, we may be of opinion that the bubbles proceed from a disengagement of gases, caused by the action of the carbon (which distinguishes iron from steel) upon some substance mingled with, or dissolved in, the steel.

In order to determine which of these two hypotheses is the right one, M. Caron considered that it would be sufficient to melt steel in a porcelain tube, traversed by a current of hydrogen or carbonic oxide gas, and to ascertain the presence or absence of bubbles. When the cup in which the steel is placed is of porcelain, no efflorescence is perceived after the cooling of the molten metal; but the surface of the ingot which touches the porcelain is covered with cavities similar to those remarked in steel melted in a crucible. This being the case, M. Caron tried to know whether the nature of the vessel in which the fusion took place did not exert some influence on the result obtained, so he substituted for the porcelain cup a vessel of magnesia, and afterwards one of quicklime (both these cups being separated from the porcelain tube by a layer of platinum); he then obtained ingots perfectly free from cavities, efflorescence, or blisters.

These experiments demonstrate that it is not the hydrogen nor the carbonic oxide gas, absorbed by the iron or steel in fusion, which produces the blisters; they show, moreover, that the bubbles proceed from two causes, which contribute equally to the formation of carbonic acid gas. These two causes are, first and foremost, the oxide of iron produced by the oxidizing atmosphere of the furnace; next the decomposition, by the carbon, of the steel, of the silicate of iron formed at the contact with the silica of the crucibles. M. Caron states that it is very easy to obtain, by compression, crucibles of magnesia very resisting and inflexible. They have the advantage over chalk crucibles of being able to be preserved for a very long time without alteration. M. Regnault states that Tillover has operated successfully at the Sevres manufactory in fabricating magnesia crucibles. He compresses the magnesia by means of a lever-beam, and so infusible are they that platinum may be readily melted in them.—*London Mining Journal.*

C. H. D.

NEW PUBLICATIONS.

TEXT BOOK OF CHEMISTRY—For the Use of Schools and Colleges. By H. Draper, M. D., Professor Adjunct of Chemistry in the New York University. Harper & Bros., Publishers, New York.

This book contains over 500 pages and is embellished with more than 300 engravings, and embodies the valuable parts published on the same subject in 1846, by Dr. Draper's father. This volume is brought up to the present time, and a free use has been made of all the most recent authorities, both in the English and other languages. The subjects are all presented in plain language; and as a text book for schools or for those who desire to obtain a knowledge of the elemental principles of chemistry, we do not think it has a superior. The author appears to be a thorough master of the subject.

PATENT-OFFICE DECISIONS.

Application for a patent for improvements in Cartridge Cases.

The Board, by Elisha Foote—These cartridges are provided with a nipple in the base, adapted to the use of ordinary percussion caps, and to prevent accidental explosions, it is inserted entirely within the cylinder in what is termed the safety chamber. In this, however, the applicant was found to have been anticipated by several previous devices, and thereupon, by amendents, he has limited his claims to the peculiarities of his construction.

In the previous devices the nipple was placed at the center of the base, so that the cap would be struck by the hammer in every position of the cartridge in the barrel. In the applicant's it is placed at one side, and can be struck by the hammer only in one position, to insure which projections are made on each side of the cartridge to fit corresponding slots in the barrel. For these variations the patent is claimed.

We are unable to perceive any advantages from this arrangement. It seems to be going from simplicity to complication—to increase rather than diminish expenses, and to require care and precision in use beyond what was necessary in previous devices. Patents are intended to be a reward for improvements—something must be given to the public in return for the privileges bestowed. It is a great mistake to suppose that every different arrangement of devices is patentable. Changes of form merely, without new results, do not come within the object and provisions of the patent laws. Inventions, even, are made patentable (Act of 1836, Sec. 7), only when deemed "sufficiently useful and important."

The decision of the Examiner in charge is affirmed.

A DR. SACE has proposed a plan of utilizing the marshes of France, which at present produce nothing but fever and ague. M. Sace proposes sowing them with Canada rice, and turning down a lot of beavers; both the plant and the animal can live in any climate—both would be equally useful, and one would support the other. At present large sums are annually sent from France to America to purchase beaver skins, which might thus become articles of home production.

An English Capitalist on Lock-outs.

Recently, Mr. Thomas Lishman, of Stockton (formerly manager of the Millbank-forge, Hart-warren, now, in partnership with his brother, delivered a lecture on strikes, at Hartlepool, in the course of which he said, to strike for the shortening of the hours of labor, put short hours further off than ever. The way to cure low wages was for working men to hoard up money and become themselves the employers of labor, as was done in co-operative societies, and limited liability companies. The lecturer instanced the great effects of the Rochdale Co-operative Society, and what had arisen from two pence a week collected among twenty-eight weavers. The annual profits of that society, now more than thirty years old, were £5,000. Teetotalism was also a tremendous help in this matter of doing away with strikes. But the worst of all these matters was a lock-out. He was entirely opposed to strikes; but still more deadly against a lock-out. It was not for a raising of the number of the hours of labor that a lock-out occurred; but a spirit of vengeance actuated the man who locked his employees out. Trade societies would be beneficial if they would neither recognize "strikes" nor "lock-outs." Already, the workmen in the iron shipbuilding yards of this district had lost over £2,000, which would be forever lost to them and to the district. If the men saved the money expended in strikes they would be able to start concerns of their own.

Improvements in Gas Engines.

In gas engines, as at present arranged, it is common to fire the charges of mixed gas and air by means of electricity, but this is inconvenient, as it is found difficult to keep the batteries in working order. Mr. Hugh Smith, of Westbourne Park, therefore proposes as an improvement to fire the charges by means of vapor which burns spontaneously on coming in contact with air; the vapor he employs is that of the liquid phosphide of hydrogen; and he passes small pipes, which he calls explosion tubes, from the gas main to each end of the cylinder, and on these tubes are applied, just before the connection with the cylinder, bottles containing the liquid phosphide, so that the gas may pass over the liquid. When the cylinder is charged with gas and air, a tap on one of the explosion tubes is opened, and the gas, carrying with it the vapor of the phosphide, enters the cylinder, and the vapor there meeting with air, an explosion at once takes place, driving the piston along the cylinder, and in this manner the piston is driven from end to end of the cylinder. This method of firing the charges is applicable whatever be the form of the combustion chamber, whether it be, as assumed, in the foregoing description, a cylinder with a piston working within it, or of other form and construction.—*London Artizan.*

Paper from Wood.

We stated some time since that the paper on which the SCIENTIFIC AMERICAN is printed contained thirty per cent of wood pulp. A company has been formed with a capital of $500,000 for preparing the pulp, and on the 12th inst., they met to examine the works, which are situated on the Schuylkill, near Philadelphia. A poplar tree taken from the hillside was converted into clear, white, soft paper, in the space of five hours. In the evening a banquet was given by Messrs. Jessup & Moore, at the Continental Hotel. About 200 guests were present, and speeches were made by the Mayor of Philadelphia and other prominent gentlemen.

A STEAM HOIST.—At the Newark Castle Wharf a steam hoist (without any engine), made at the Trent Iron Works, has been successfully tried. A timber frame forming the base of the machine, incloses a large cylinder. On the steam being admitted to it a beam of iron, armed with strong teeth, is forced out, and from this motion is given through a simple arrangement of wheels, which causes the chain barrel to revolve. The direct action of steam is thus brought into use without the intervention of a steam engine as in ordinary steam cranes. The working is easy, and without noise.

A BALLOON train, to ply between the Place de la Concorde and the Champs de Mars, is spoken of as one of the schemes to be tried during the great gathering in Paris next year.

Notes and Queries

E. A. V., of Md.—Illuminating gas may be made by the destructive distillation, in a close retort, at a bright red heat of wood, bituminous coal, petroleum, and other organic compounds which contain hydrogen and carbon. Several forms of apparatus for the purpose—some very cheap and simple—have been illustrated in our columns. The simplest, and probably the best apparatus for obtaining light from petroleum, is a kerosene lamp.

C. W. B., of N. H.—In order not to lose any power in conducting your water down an inclined pipe to your turbine, you must have the pipe of sufficient size to keep up the full pressure of the head upon the wheel.

B. H. P., of Iowa.—The specimen which you send us is a piece of a tin pail. If you "found it 40 feet below the surface and 17 feet in sand stone rock," some person must have carried it there. We have known miners in California to be puzzled by finding pieces of their own shovels in their diggings.

A. S., of Iowa.—The most effectual mode of making bridge bolts rust proof is to cover them with zinc—galvanizing, as it is improperly called. Next to this the best plan is to paint them with linseed oil and white or red lead.

E. S. W., of Conn.—For directions for making black ink, see page 211, current volume.

B. P. B., of Conn.—Blowers must of course be so placed as to allow a free supply of air.

G. A. S., of N. Y.—Professor Chandler's elaborate discussion of boiler incrustations having been so recently published in our columns, nothing in your paper, can be new to our readers, excepting, possibly, the suggestion that lime in the feed water may combine with the grease from the engine to form lime soap.

E. C. E., of Pa.—It will take any person of ordinary intelligence, certainly not more than thirty minutes to understand chemical symbols. He needs to be told only that they are the initials of the names of the elements, and that the atomic weight of any element is the number of times which its atom is heavier than the atom of hydrogen. We can conceive no greater waste of time than the attempt to teach chemistry without first teaching Dalton's atomic theory.

B. F. M., of N. Y.—A cylinder is a round body of the same size throughout its whole length; a body with a circular base which tapers to a point, is called a cone. The form of the cigar steamer approaches that of two cones joined at their bases; it is therefore called conical in form—never cylindrical.

J. B. F., of——.—"I wantto know what book is the best for a young man to take that wants to learn about steam and steam engines." One of the best is Bourne's Hand Book. We can send it for $1 50,

C. C., of N. Y.—The directions for making a sun dial were published in Vol. 2d. New series page 96—No. 6.

J. H. H., of N. Y.—Chloroform, benzine, and naptha are all solvents of india-rubber.

S. P., of Pa.—We cannot tell you how to become a locomotive engineer in the SCIENTIFIC AMERICAN.

J. S., of N. Y.—You have omitted to send anything but the size of your shaft, viz., 3½ inches by 13 feet long, and you wish to know whether it is strong enough for your water wheel. If we knew more about it we should give you an answer with pleasure. Mills that have balanced wheels and sashes can be run much faster than others not balanced.

F. M. H., asks.—"If I obtain a patent for spring bed bottoms with slots suspended by annular rubber rings, can I apply the same to carriage seats and sell rights for same without taking out a separate patent?" No A separate patent will be needed.

Drawing Dust from Shops.—If Brooklyn Inquirer will call, we will relieve him, or no pay. American Ventilation Company, 17 Courtlandt street, N. Y.

W. F. M., of N. J.—A Barker's mill applied to a hydrant would probably yield less power than a little turbine, and would be more expensive.

G. F., of Me.—For a discussion of the power of wind mills we refer you to Morin's Mechanics.

S. W. M., of N. Y.—There is no other disinfectant for your stagnant pond so cheap as the surrounding soil. You must either fill or drain it.

L. S., of Cal.—In a syphon gage the length of the divisions in the scale is not varied by the difference in the area of the surface of mercury acted upon by the steam.

W. G. B., of Del.—Electroplating with iron is effected by reducing the iron from the proto-sulphate, or the neutral chloride. Brass cannot be deposited by the battery. Perhaps by employing a very powerful current you may deposit the copper and zinc simultaneously, and then unite them by heat.

T. G. of Conn.—We know of no such substance as the oxalic muriate of tin.

E. S., of Ohio.—To make cloth water-proof, cover it with a mixture of paraffine and a minute proportion of linseed oil.

L. O., of N. Y.—The specific gravity of the human body is very nearly the same as that of water; it is said that a lift of about four pounds is sufficient to float an ordinary person. The specific gravity of cork varies very widely with different samples, but it is probable that from one-tenth to one-fourth of a cubic foot would float a person weighing 175 lbs., provided the whole of the body and head except the month was submerged.

T. H. M. H., of Pa.—The swarming of bees is easily prevented by keeping them in a large hive or room. This plan is extensively practiced. The hymenial flight is liable to take place during the season for most profitable swarming.

Patent Claims

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING APRIL 10, 1866.

Reported Officially for the Scientific American

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

53,765.—Manufacture of Cans.—John T. Ackley and John K. Truax, Philadelphia, Pa.:

We claim the application of pitch or a bituminous or resinous cement to the inside or the outside of a box or can, made wholly or partly of paper, substantially as and for the purpose above set forth.

[The object of this invention is to produce a can made wholly or partly of paper or pasteboard, which will hold greasy and corrosive solids and fluids without leaking or oozing through its walls. The inner surface is coated with a resinous or bituminous cement, so as to protect the substance from which the can is made from the action of its contents, whereby a can composed wholly or partly of paper can be made capable of holding solids and liquids of a greasy or volatile and penetrating character. The outside may be coated likewise, if desired, and the lid or cover is also protected by the same means.]

53,766.—Churn.—Levi O. Allen, Gardiner, Maine:

First, I claim the compressing curb, C, and disk, H, acting in combination with the adjustable floats inclosed by them, as and for the purpose described.

Second, I claim the arrangement and mode of adjusting the floats relatively to each other and the containing vessel, as and for the purpose described.

Third, I claim the ribbed plates in each end of the churn box, in combination with the adjustable floats.

53,767.—Constructing Wells.—E. S. Alvord, Milford, Del.:

First, I claim the combination of the driving pipe, A, the inclosed short pipe, C, and the pump tube, B, arranged substantially as above described.

Second, I also claim the combination of the short pipe, C, the pump tube, B, when surrounded by gravel or other analogous filtering material, arranged substantially as set forth.

[The object of this invention is to construct a well by sinking or driving tubes into the ground, and forming at the bottom a cavity, the lower part of which is filled with gravel or other filtering material, to prevent dirt from entering the pump when it is operated.]

53,768.—Staging for Buildings.—William Arrouquier, Worcester, Mass.:

First, I claim an adjustable and portable staging constructed so that it can be attached to the window frames, or similar apertures of a building, which consists of the combination of the pieces, A B C D, bolts, E G, and supported piece, F, in the manner and for the purpose herein described and set forth.

Second, In the combination with the staging above described, I claim the metal frame or carriage, H, having friction rolls, i h h, and lips, g and f, as and for the purposes herein set forth.

53,769.—Cistern for Draining Peat.—E. H. Ashcroft, Lynn, Mass.:

I claim the tank or drainage vessel constructed as described, with perforated sides and bottom, together with the perforated tubes connected therewith.

53,770.—Heater for Chimneys.—Thomas M. Aspinall and Stephen H. Whitlock, Piqua, Ohio:

We claim the arrangement of the heater box for insertion in the chimney above the arch and provided with a flue, A a A, for the passage of the heated air, etc., from the fire, a cold air induction opening, B, and a warm air delivery, C, substantially as described and represented.

53,771.—Leather Splitting Machine.—Cyrus W. Baldwin, Charlestown, Mass., and Lorenzo D. Hawkins, Stoneham, Mass.:

We claim the arrangement as well as the combination of the hand wheel shaft, its right and left screws, and the two wedges in the frame of the machine and with the knives applied in the frame of the machine and with respect to the boxes of the upper or gage roller, and the springs or their equivalents applied to such boxes, substantially as specified.

We also claim the combination as well as the arrangement of the abutments, K K with the hand wheel shaft, its right and left screws, and the two wedges applied in the frame of the machine and with respect to the boxes of the upper or gage roller, and the springs or their equivalents applied to such boxes, substantially as specified.

53,772.—Tree Protector.—Burroughs Beach, West Meriden, Conn. Antedated March 30, 1866:

I claim a disk, A, constructed of wood, metal, or other suitable material, and of two or more parts, in such a manner as to admit of being snugly adjusted to the trunk of a tree in combination with the pendant flange, B, at the under side of the disk, substantially as and for the purpose set forth.

I also claim the tube C, inserted in the disk in connection with the vessel, D, substantially as and for the purpose specified.

53,773.—Plow.—J. S. Beals, Alabama Center, N. Y.:

I claim the supplemental share, D, constructed substantially, as shown and described, and attached to the plow beam at the rear of the coulter and point of the share of the main plow, as and for the purpose herein set forth.

53,774.—Extension Table.—William Beadle, Keyport, N. J.:

I claim the leaves, D D, falling parallel to the line of extension when in combination with the sliding tops, C C, the removable top or center boards, G G, and stationary box frame, for the purposes set forth.

53,775.—Float for Boats.—Alonzo B. Boon, Galesburg, Ill., assignor to self and J. Scott Richnor, Muscatine, Iowa:

I claim the adjustability of the buoys or floats, B, by means of the cars, c, and plates, d, and their arrangement and attachment to the platform, A, substantially in the manner and for the purpose as herein set forth.

53,776.—Clamp for Brooms.—Theodore F. Boyer, Harrisburg, Penn.:

I claim the wire clamp described, the same consisting of the upper part, A B, formed of a single piece of wire, a', as described, and two straight pieces, a2 a3, attached thereto, and of the lower part, C D, formed and constructed like the said upper part, A B, with the addition of the uprights, b1 b2 b3, as described; the said two parts being adapted for adjustment together on a broom, substantially as and for the purpose described.

53,777.—Manufacture of Cheese.—Jenks Budlong, Chardon, Ohio:
I claim the described improvement in preparing or making cheese for market by condensing the curd in a series of hoops arranged as specified, by the action of the screws, E F, shaft, I, and beam, G, arranged as specified.

53,778.—Combined Umbrella and Cane.—P. T. Brownell, Elmira, N. Y.:
First, I claim in umbrellas and parasols, placing the stretchers outside of and above the ribs, and hinging the inner ends of the ribs to the runner, substantially as described.
Second, I also claim the cane, A, made substantially as above shown, with a tube, C, at its upper end, a sliding box, K, to which the stretchers, J, are hinged, and rod, F, which operates the runner, I substantially as described.
Third, I also claim the combination of an umbrella made substantially as described, with a hollow cane, A, which, when the umbrella is spread, serves as its handle, and when it is closed up, serves as a receptacle for it, substantially as shown.

53,779.—Artificial Fuel.—James F. Buckley, Brooklyn, N. Y. Antedated March 30, 1866:
I claim prepared charcoal saturated with whisky, volatile oils and a glutinous paste formed into blocks, as a cheap, aromatic, artificial fuel for common uses.

53,780.—Die for Nut Machines.—Orrin C. Burdict, New Haven, Conn.:
I claim a hexagonal die constructed in the manner substantially as herein set forth.

53,781.—Die for Punching.—Orrin C. Burdict, New Haven, Conn.:
I claim a die constructed substantially in the manner described, so that the size of the die may be adjusted by taking from or adding to the number of parts, substantially as specified,

53,782.—Bolt-heading Machine.—Orrin C. Burdict, New Haven, Conn.:
First, I claim the combination of the hinged bar, A', cam, B', and vibrating lever, C', for the purpose of arresting the movement of the slide, K, without disconnecting the power from the machines.
Second, The combination of the dies, E' and H', as preliminary shaping dies, when the said dies are combined with the herein-described nut machine, so as to accomplish the preliminary shaping before the bar so shaped is presented in front of the die box.

53,783.—Thread Tension Device for Sewing Machines.—Thomas A. Chandler and H. C. Goodrich, Rockford, Ill.:
We claim the pivoted lever, I, and jaws, E, in combination with the spring, f, arranged in the manner and operating as and for the purpose set forth.
Second We claim the adjustable clamp, H, plate, A, and pivot, l, in combination with the spring, l, and lever, I, arranged and operating substantially as and for the purpose set forth,

53,784.—Stave Machine.—Thomas Cheshire, Cincinnati, Ohio:
I claim indenting or compressing into the edges of staves grooves or creases, so that the after swelling out of the wood in the casks or barrels shall make perfectly tight and strong joints, substantially as described.
I also claim, in combination with indenting or creasing wheels, the jointers pivoted and made yielding on the swing or rocking plates, F, substantially as and for the purpose described

53,785.—Beehive.—James B. Child, Lee Center, Ill.:
I claim the combination of the cross bar, I', horizontal bars, I I, lifting bars, G G, and spring catches, H H, when each bar, I, is provided with two lifting bars, G G, and all arranged to operate as and for the purposes specified.

53,786.—Paper Window Shade.—Lewin A. Colbert, Baltimore, Md.:
I claim, First, A window shade made of paper connected to one or more rollers by a woven fabric, and rendered translucent either before or after mounting, substantially in the manner described.
Second, The compound spring rollers and cornice box arranged and operating substantially as and for the purposes set forth.

53,787.—Toy Boat.—George J. Colby and Levi H. Thomas, Waterbury, Vt. Antedated March 30, 1866:
I claim a toy boat constructed in the manner as herein described, as a new article of manufacture.

53,788.—Water Wheel.—A. P. Conant, Smithland, Ky.:
I claim the arrangement of the tangential buckets of the wheel, C, curved bucket of the discharge wheel, D, and L-shaped gate, B, constructed and operating in the manner and for the purpose herein specified.

53,789.—Stovepipe Drum.—Theodore R. Cook, Saratoga Springs, N. Y.:
I claim the radiator, A, having the internal tubes, B and C, spiral diaphragm, a, and damper, E, all arranged and operating substantially as herein shown and described.

53,790.—Apparatus for Administering Medicines.—Samuel Curtiss, Jr., Williamsburgh, N. Y.:
I claim an apparatus for measuring and administering medicines, constructed and arranged substantially as described and for the purposes set forth.
[The object of this invention is to furnish an apparatus for containing medicine, when prepared for the patient, and it consists of a cup for containing the prepared medicine, having a scale to show the quantity prepared, of a reservoir for measuring the quantity to be given at one time, and a spoon-shaped orifice for administering the same, the medicine being forced from the measuring reservoir to the administering orifice by the action of a piston.]

53,791.—Broom Head.—John Danner, Canton, Ohio:
I claim in combination with a broom head having slots or openings in each of its sides, the clamping plate, C, and through or tightening bolts, for the purpose of first arranging and then tightly clamping the broom corn or other filling to the broom head, substantially as herein described and represented.

53,792.—Harrow.—N. A. Davis, Sutton, N. H.:
First, I claim suspending the cultivator head or rake in front of the carriage wheels by means of flexible supports so as to allow the vibration of the head laterally, and allow the same to be raised or lowered by the levers, G G, to any required hight to regulate the operation of the teeth.
Second, I also claim the flexible guards, P, attached to the outer end of the cultivator head D, and reaching forward to near the front ends of the shafts, C, for the purpose of guarding the head from contact with stones, stumps, trees, etc. as herein specified.
Third, I also claim the manner of fastening the teeth, I, to the cultivator or rake head, D, by means of the arm, R, secured in the slot, T, to prevent the lateral swaying of the teeth, as specified, and in combination therewith, I claim the spiral spring, s, arranged and operating as set forth.
Fourth, I also claim broadly suspending a cultivator head or rake by means of flexible supports in front of the wheels and operating the same by means of a lever or levers from the driver's seat, as and for the purpose specified.

53,793.—Washing Machine.—David Dennison, Annisquam, Mass.:
I claim the combination of the slatted frame, C, pressure roller, E, bar, D, swinging arms, D' D', bars, G H, spring, F, and box, b, constructed and arranged relatively to each other, and operating in the manner and for the purpose herein specified.
I also claim the arrangement of the swinging arms, D D, bars, G H, spring, F, box, f, and roller, E, in the manner and for the purpose herein specified.
[This invention relates to a new and improved clothes-washing machine of that class in which a fluted pressure roller is employed in connection with a slatted bed. The object of the invention is to obtain a machine of the class specified which will act uniformly upon the clothes, subject all parts of them to an equal pressure and friction, and cleanse them without injury.]

53,794.—Car for Transporting Petroleum.—James and Amos Densmore, Meadville, Pa.:
We claim the two tanks, B B, attached to the platform of the car, A A, by means of the frame work, C C C C and C C C C, together with the bolts, 1 2 3 4 and 1 2 3 4, directly over the trucks when the same are constructed in the combination as hereinbefore described, and for the purposes set forth hereinbefore, or any other mechanical construction, substantially the same and which would produce the same result.
We claim the combination and application as entirely new, and as a valuable and useful improvement.

53,795.—Plumb Level.—Michael W. E. Doran, Indianapolis, Ind.:
I claim the construction and arrangement of a level or angle indicator by means of the plate, F, with slot, G, for adjusting the same across the shaft, E, and having the pendents, H, when operated substantially in the manner and for the purposes set forth.

53,796.—Button.—Frank Douglas, Norwich, Conn.:
I claim a button secured by pointed screw, substantially as and for the purpose described.

53,797.—Clothes Drier.—James W. Epperson and Thos. W. Farrill, Woodhull, Ill.:
We claim the movable head block, F, in combination with pulley, g, and hook, h, substantially as and for the purpose described.
The axle, b, in combination with the head block, f, and the lines, l and k, substantially in the manner and for the purposes described.

53,798.—Apparatus for Carburetting Air.—Horatio Fairbanks, Boston, Mass.:
I claim an improvement in apparatus for carburetting air in the reservoir, A, in combination with one or more reservoirs D G, and a series of frames or plates covered with cloth, or its equivalent, and provided with suitable openings for the circulation of the air, operating substantially as set forth.

53,799.—Machine for Stitching Needles into Paper.—George P. Farmer, Philadelphia, Pa.:
I claim, as an improvement on my machine patented July 1, 1862, the within-described box or hopper, A, separated into several compartments of different sizes and each compartment separated into other compartments by partitions, i i, all substantially as and for the purpose herein set forth.

53,800.—Method of Treating Leather Scrap.—Henry B. Farwell, Boston, Mass.:
I claim recovering the tallow or fatty matters from whitenings, or scraps of leather, in the manner as set forth.
I also claim in combination with the same the employment of oil of vitriol, as and for the purpose set forth.

53,801.—Horse Shoe.—Joseph W. Faulkner, Rockford, Ill.:
First, I claim the bifurcated spring clips with two prongs, constructed, arranged and operating as described for the purposes set forth
Second, The combination of the spring draw clip with the shoe, by means of the transverse slot and screw nut, so that as the clip is drawn to the shoe the shoe is tightened upon the hoof

53,802.—Well Borer.—F. Fohr, Rowlesburg, West Virginia:
I claim the use of a double connection between the sinker and drill, such for instance as the spring clamp and screw, or any other equivalent connection, for the purposes set forth.
[This invention consists in the combination of a spring catch or clamp with the sinker and drill of a well borer, in such a manner that a double connection between the drill and sinker is obtained, and if the screw or ordinary connection breaks, the drill is raised by the catch and prevented from being wedged into the hole.]

53,803.—Musical Instruments.—Joseph Foster and Ephraim Foster, Keene, N. H.:
We claim the tremulo reed, C, constructed as above shown, and applied to musical instruments substantially, as described, to produce a tremulo tone for all the notes which are played while the tremulo reed is operated.

53,804.—Sawing Machine.—Henry Fryatt and E. C. Edmonds, Buffalo, N. Y.:
We claim the arrangement and combination of the vertically sliding gate, C, and the horizontal ways, d d, thereon for the tongues, g g, of the saw to slide in, substantially as and for the purpose herein specified.
We also claim the combination and arrangement of the sliding gate, C, and the graduated balance lever, I, with its weight, K, substantially as and for the purpose herein specified.

53,805.—Amalgamator.—Willard Monroe Fuller, Chicago, Ill.:
In an apparatus for extracting gold and silver from quartz, constructed substantially as herein described, I claim surrounding the amalgamating kettle with an annular chamber, the central space of which shall form the fire chamber of the apparatus, the said annular chamber being so arranged in relation to the kettle that the quartz or tailings may be drawn off simultaneously from all points of the circumference of the kettle, substantially as and for the purposes herein set forth.
In an apparatus as above described, I claim connecting the said annular chamber with a receiving chamber into which the quartz or tailings flow, which said receiving chamber may be organized for continuous or intermittent action, substantially as herein described.
In combination with the apparatus herein described, I claim the valve placed in the feed or hopper, and constructed and arranged substantially as set forth for regulating the flow of the ore into the kettle.
In apparatus constructed and operating as set forth, I claim the combination and arrangement of valves whereby the automatic discharge of the tailings may be effected.
In apparatus constructed substantially as set forth, I claim making the doors and flues which lead from the interior of the vessel to the outside thereof, of an OG shape, that is to say, with inclined surfaces to deflect the tailings and prevent the possibility of its accumulating and choking up the apparatus.

53,806.—Stovepipe Drum.—Milo Gage, Medina, N. Y.:
I claim the combination of the chambers, C D, with the tubes, A B B', the chamber D, being divided into the two compartments g h, by the partition and damper, b c, and the tubes, B B', connecting alternately with said compartments, the whole operating in such a manner as to combine the advantages of a direct and indirect draught with a large amount of radiating surface, substantially as herein specified.

53,807.—Machine for making Eyelets.—Thomas Garrick, Providence, R. I.:
First, I claim the combination of the protuberance or teat, r, on the end of the hub or punch, t, with the cutting edge, a, of said punch, substantially as described for the purpose set forth
Second, I claim the combination of the cutting die, e, and fixed hub and punches, t, constructed substantially as described with the moving cleaners d d, constructed and operating substantially in the manner and for the purpose set forth.
Third, I claim the combination of the mold in the movable punch for shaping the exterior of the eyelet, and the cutting shoulder, 2, constructed as described with the fixed hub or punch, t, constructed and operating in connection substantially as described for the purpose set forth.

53,808.—Waterproof Collar.—Henry C. Gibson, Camden, N. J.:
I claim a waterproof gentlemen's collar, the interior side of which is made of cloth, prepared substantially as herein described, and otherwise, and the exterior or paper side with or without glazing or enamel, made to resemble linen or other textile fabrics in use for the purpose, all as herein described.

53,809.—Bag Holder.—Cyrus F. Gillett, Sparta, Wis.:
First, I claim securing bags to funnel receivers by means of clamping supports, B B B, substantially as described.
Second, The hinged or flexible connections, a a, of the legs, B, in combination with the funnel receiver, A, and hoop, C, substantially as described.

53,810.—Pump.—Jacob Goodyear, Borough of Carlisle, Penn.:
I claim the combination and arrangement of the cylinders, A and A', B and B', the valves a and a', the rims m and m', and the india rubber rings, C and C', as and for the purposes set forth and described.

53,811.—Sheep Rack.—G. F. and T. M. Gondy, Independence, Ohio:
First, We claim the adjustable covers, B, arms or limbs, A', and chains, f f, in combination with the shaft, G, and rack, substantially as and for the purpose set forth.
Second, We claim in combination with the above, the adjustable guards, H, and cords, n, substantially as and for the purpose set forth.

53,812.—Paddle Wheel.—James Granger, Zanesville, Ohio:
The combination of the paddles, H, arms, I I, connecting holders, M, bridge pieces, J, endless chain G, and pulleys D E, constructed and arranged in the manner and for the purpose herein specified
[This invention relates to that class of paddle wheels in which the paddles are attached to endless chains passing over wheels, and it consists in so arranging the said wheels, and hanging the paddles on the endless chains, that a sweep in a circular direction will be given to the paddles in their passage through the water, the importance of which is obvious.]

53,813.—Step for Spindles.—Charles E. Griffin and Thomas Marsh, Smithfield, R. I.:
We claim the independent step for spindles, B, in combination with a close oil chamber, a b, substantially as described.

53,814.—Hay Rack.—W. E. Grimes, Allen, Mo.:
I claim the arrangement of the sections A C L and D, with the windlass, H, and pole, c, as and for the purpose herein specified.

53,815.—Process and Compositions for printing Photographic Pictures.—Victor M. Griswold, Peekskill, N. Y.:
First, I claim as a new article of manufacture, the photographic surface described with or without the opal picture enamel.
Second, The composition of the opal collodion, by the formula, No. 1, and in the manner hereinabove set forth, or in any manner substantially the same.
Third, The fuming of the plate over a mixture of ammonia, alum, and unslacked lime, as hereinabove set forth.
Fourth, The composition of the sensitizing solution, by the formula, No. 2, and in the manner hereinabove set forth, or in any manner substantially the same.
Fifth, The composition of the opal picture enamel by the formula, No. 3, and in the manner hereinabove set forth, or in any manner substantially the same.
Sixth, The combination in the process of manufacture, of the opal collodion, sensitizing solution, and picture enamel hereinbefore described, as and for the purpose hereinabove set forth.
Seventh, The process hereinabove described, for preparing and finishing an opal surface for photographic purposes.

53,816.—Machine for Pressing Glass Buttons.—Timothy Guilford, Cheshire, Conn.:
I claim a die constructed in several parts substantially in the manner described in combination with the punch, F, and follower, E, as and for the purpose specified.

53,817.—Letter File.—James C. Hadden, New York City.:
I claim a file for letters, newspapers, etc., in which two or more angular-shaped holding pins or staples therefor are used, and arranged so as to operate substantially in the manner described.
I also claim in combination with the above, projecting the opposite corner of the book to that in which the letter-holding pins are used, by means of a metallic plate or plates, or other suitable material, substantially as described.

53,818.—Cane Stripper.—Joel A. Hall, Columbus, Ohio:
First, I claim, securing the stripping knives together in pairs by means of elastic, or non-elastic holders, C C, applied to their extremities, substantially as described.
Second, The construction of the cutting portions of the knife blades, G G, with curved edges, g g, substantially as described.
Third, Providing for adjusting and setting the guide rollers, D D, nearer to or further from each other, said rollers being applied to the elastic knife blades, substantially as described.

53,819.—Lantern.—John O. Harris, Reading, Penn.:
First, I claim the cap, E, on the top of the globe, A, of the lantern, closed at its upper end, and provided with lateral openings, C, in combination with the jacket, F, closed at its upper end and provided with lateral openings, e, and also provided with a conical flange, G, at its lower end, having a perforated partition plate, substantially as and for the purpose set forth.
Second, The conical base, B, provided with perforations, b, in its bottom, in combination with the jacket F, and cap, E, at the upper part of the lantern, substantially as and for the purpose specified.

53,820.—Gas Heating Apparatus.—David G. Haskins, Cambridge, Mass.:
First, I claim, the application, substantially after the manner herein described, of the flame of any gas, or of any oil, or fluid, to the heating of a current of air which may be introduced from without into rooms, apartments, or buildings.
Second, I claim the combination with an outer casing, A, and an inner chamber, B, of heat-retaining and radiating devices, substantially as and for the purpose set forth.

53,821.—Smith's Vises.—S S. Hepworth, Boston, Mass.:
I claim the sleeve, B, in combination with the nut, A, connected to the movable jaw, E, operating as and for the purpose described.

53,822.—Rail Road Switch for Street Cars.—John A. Heyl, Boston, Mass.:
I claim the arrangement of the double flanged wheel, C, and attached wheel, d, operated by levers, e and f, upon and in combination with the axles of a car as described, and operated with the said double-flanged wheel, astride of the guide rail, substantially as described.

53,823.—Shingle Machine.—Simeon Heywood, Claremont, N. H.:
I claim, in a shingle or other machine, the arrangement of the bars, A A, the movable bars, B B, the inclined planes C C C C, the racks, K K, the pinion, J, applied to the tilting bed, as and for the purposes set forth

53,824.—Lamp Burner.—George Hillegass, Philadelphia, Penn.:
First, In combination with the sides, B B, I claim the wings, C C, substantially as and for the purpose set forth.
Second In combinations with the sides, B B, I claim a device for adjusting the width of the aperture, substantially in the manner and for the purpose set forth.

53,825.—Polishing Wheel.—Leonhard Holtzscheiter, Philadelphia, Penn. Antedated March 25, 1866.:
I claim the polishing wheel consisting of a disk, A, of wood or other suitable material, and a series of strips, D, of leather, packed and cemented together and into a groove in the periphery of the said disk, all as set forth.

53,826.—Hat-Pressing Machine.—Nicholas B. Hooker, Newark, N. J.:
First, I claim a revolving hat block, in combination with a series of irons constructed and operating so as to be self-adjusting in conforming to the sizes and shapes of different hat blocks, and capable of simultaneously pressing the "tip" "side-crown" and "brim," substantially as and for the purposes set forth.
Second, The pivoted hanging frame, H, when so constructed and arranged as to support, and act in combination with, a series of irons and their operating devices capable of pressing the "side-crown," "tip" and "brim," substantially as specified, for the purpose of simultaneously removing all of the irons from the hat by swinging the frame aside.
Third, The rod J, carriage, L, and levers K and M, in combination with an iron, I, substantially as specified, for the purpose of producing a self-adjusting verticle and lateral pressure of said iron upon the "tip" and "square" of a hat upon a revolving hat block.
Fourth, The slotted lever, T, rods, n and Q, and lever, R, in combination with the frame, H, and an iron, substantially as specified for the purpose of producing a self-adjusting verticle and lateral pressure of the said iron upon the "brim" and "band" of a hat upon a revolving hat block.
Fifth, The combination and arrangement of lever, Z, rods, Y and t, plate, X, springs, u, and an iron, V, substantially as specified, for the purpose of producing a self-adjusting lateral pressure upon the "side-crown" of the hat, yielding in conformity to the oval shape of the side-crown of the hat block.
Sixth, An iron, V, when provided with the partition, d', opening

e', and burner, f', substantially as and for the purposes set forth.

Seventh, The combination and arrangement of the frames, H, levers, K R M T Z, irons I P V, table, A B, and block plate, D, substantially as and for the purposes set forth.

53,827. Catch for Money Drawers.—Saunders Hubbell, Jr., Urbana, Ohio:

I claim, First, the catch, E, the rod, F, and the spring arm, G, when operated substantially as and for the purpose described.

Second, The drawers, C D, when combined with the catch, E, substantially as described and for the purpose specified.

53,828.—Attaching Thills to Carriages, Etc.—Winford R. S. Hunter, Blackberry, Ill.:

I claim, First, The employment of a spring, C, in combination with the slotted thill head or iron, substantially as described and for the purposes specified.

Second, I claim providing the slot, a, with the recess, c, as and for the purposes set forth.

Third, I claim the combination of the spring, C, the bolt or pin, E, and thills, A, provided with a slot, a, arranged as and for the purposes specified.

53,829.—Oil Tank.—Joshua K. Ingalls, New York City:

First, I claim the means of relieving the pressure within the tank or vessel, substantially as described.

Second, I claim the jointed arm, c, or any equivalent device operated to regulate or adjust the pressure within the tank or vessel.

Third, I claim the strainer or sprinkler, T, arranged as shown and operated in connection with the relief pipe, as described.

53,830.—Hame.—Francis X. Kaffer, Champagne City, Ill.:

I claim the combination of the notched staple, a, with the flat spring, b, substantially as and for the purposes described.

53,831. Bolt Heading Machine.—Charles Kane and James Kane, Pittsburg, Pa.:

First, We claim the dies, I and K, having their pressing surface at right angles with the center of their motion and having projecting ledges or shelves, i i, and k k, so that when the dies come together they leave between them a parallelopipedic space, the dimension of which is greater in a direction perpendicular to the line of motion of the dies.

Second, The cutters, M and N, in combination with the pressing dies, I and K, arranged in the manner and for the purpose specified.

53,832.—Bolt Machine.—Charles and James Kane, Pittsburg, Pa.:

First, We claim a bolt machine having a double set of dies one above the other, in the one of which to shave and in the other to cut the square neck of the bolt and head, the same arranged and operating substantially as described.

53,833. Combination of Ruler, Blotter and Paper Cutter.—Lewis Katen, Greenpoint, Brooklyn, N. Y.:

I claim the arrangement of the plate and the uprights in combination with the revolving blotter, the whole so arranged and constructed that they may be used for the various purposes herein set forth and described by simply reversing the position of the article.

53,834.—Beverage.—Jonathan H. Kenyon, Sempronious, N. Y.:

I claim birch nectar compounded of the ingredients herein described.

53,835. Bread and Meat Cutter.—Solomon Kepner, Pottstown, Pa.:

I claim the combination of the holder, F, with the frame, C, and knife, H, substantially as described and for the purpose set forth.

[The object of this invention is to furnish a convenient instrument for slicing bread or meat, and it consists of a platform upon which, and a frame within which, the article to be sliced is placed. In this position it is held by a movable holder applied to its upper part, so that the descending knife may cut a slice of exactly the required thickness.]

53,836.—Tree Protector.—Dallas Knowlton, Liberty, Maine:

I claim a tree protector having plate, A, cut open on one side as represented and having apertures, C, therein with pin, D, all constructed, combined and arranged substantially as herein specified as a new article of manufacture.

53,837.—Cultivator.—John Lacy, Chicago, Ill.:

First, I claim attaching the shovels to beams having an independent vertical movement and so connected to the movable frame, L H, that by moving the letter sidewise all the plows are moved with it, said movable frame being pivoted at b, substantially as and for the purpose set forth.

Second, I claim interposing the conical rollers, a, between the fixed and movable frames to enable the latter to be more easily operated, as shown and described.

53,838. Hand Corn Planter.—Richard Lambert, Cortland Village, N. Y.:

First, I claim in combination with the slide, G, and rod, F, the adjustable block, H, substantially as and for the purpose set forth.

Second, I claim the arrangement of the case, B, with the double bottom, M M' the slide, G, rod, F, and spiral springs, L L, substantially as described.

53,839.—Method of Recovering Waste Alkali Used in the Manufacture of Paper—Theodore F. Lehmann, Allegheny, Pa.:

I claim converting the unspent caustic, alkali of alkaline solutions into a carbonate of the same by artificial application of carbonic acid.

53,840.—Steering Screw.—Frank Liburn, New York City:

I claim the arrangement of the shaft, D, the beam, E, and cord, e, gear wheel, F, and shaft, G, constructed and used, as and for the purpose herein specified.

Second, Arrangement of the cars, H and K, with the toggle joint and propeller, B, as and for the purpose herein specified.

Third, The combination of the propeller, B, with the steering propeller, , when the two are connected and arranged to operate by the means substantially as herein specified.

53,841. Measuring Funnel.—James Lloyd, Springfield, Ohio:

First, I claim the combination with a funnel of a measure index and the turning or sliding valve, E, and its valve seat, substantially as set forth.

Second, In combination with a funnel measure, a movable gage or scale, J, as and for the purpose set forth.

Third, In combination with the sliding valve, E, and the funnel measure, A, the movable gage or scale, J, substantially as set forth.

Fourth, In combination with the funnel measure, A, and the sliding valve, E, the air tube, K, located within the spout, so as not to impair the exterior cylindrical form of said spout.

53,842.—Car Seat. Edwin Lockwood and George W. Pitman, Bordentown, N. J.:

First, We claim the detachable back, B, united with the frame through the arm pieces, C, by means of the hooks, D, and brace E, and catch, G F, so as always to maintain the same relation to the seat, A, substantially as set forth.

Second, We claim in combination with the detachable backs, B, a double system of rods and levers so as to make either side of the seat adjustable, substantially as set forth.

Third, In combination with the levers, K, we claim the rods, M M' when arranged substantially as and for the purpose set forth.

Fourth, In combination with the rods L and L' we claim a series of notches, I and the fixed rod, P, operating as a stop, so arranged that a greater or less inclination can be given to the seats, A, substantially as set forth.

Fifth, We claim the adjustable foot rest, S, arranged substantially and for the purpose set forth.

53,843.—Apparatus for Carburetting Air.—Charles B. Loveless, Syracuse, N. Y.:

First, I claim placing the oil and gas chambers under water in the tank, substantially as described and for the purposes specified.

Second, The closed cylinder, C, containing the oil and air chambers, substantially as set forth.

Third, The glass indicator, C, constructed and operating substantially as described.

Fourth, The oil feed pipe, F, passing in part through the water, substantially as described.

Fifth, The supply gas pipe, L, passing in part through the water, substantially as described.

Sixth, The tank, A, and blower, B, in combination with the closed cylinder, C, substantially as described.

53,844.—Washing Machine.—Philip Lutes, Platte City, Mo.:

I claim the structure of the upper portion of the washing machine, consisting of the central piece or lid, A', and the hinged end pieces, A2 A2, with the intervening spaces or openings, G G, as set forth.

Second, I claim the combination and arrangement of the concave tub, A, rollers, B, rubber, C c', arms, C' C', handle, C2, bearings, D, central piece or lid, A', hinged end pieces, A2 A2, and intervening spaces or openings, G' G', the whole being constructed and operating substantially as and for the purposes described.

53,845.—Machine for Cutting and Finishing Marble.—James W. Maloy, Boston, Mass.:

I claim, First, The combination of a revolving tool or tools with a feeding table or platform, susceptible of two motions, one tangential to the circle described by the said revolving tool or tools, and the other at right angles to that of the first, as set forth and for the purpose specified.

Second, The combination of the two traveling tables or platforms, operating together as described.

Third, So arranging and operating the table or platform that supports the marble or other material to be acted upon as to convey the latter automatically to the revolving tool or tools.

Fourth, The arrangement of the clutch nut, d d', screw shaft, q' q', revolving shaft, i i, and vertical shaft, b b, operating as described for the purpose of feeding the traveling table along and yet permit its disengagement from the said devices, as specified.

Fifth, The use of the adjustable lever swivel clamp for holding the material to be acted upon firmly in its place, as described.

Sixth, The use of a revolving, grinding or rubbing cylinder so arranged and constructed as to contain the grinding material and deliver it through apertures to the material to be acted upon, as set forth.

Seventh, In combination with the revolving grinding or rubbing tool, the pronged lever arm, h'' h'', for the purpose specified.

Eighth, The arrangement of devices for feeding the revolving tool or tools up and down, the same consisting of the screw shaft, q' q' screw nut, O' O', and the shaft, t t as described.

Ninth, The arrangement of devices for holding the sectional cutters in their place and so that they can readily be inserted or removed as specified.

53,846. Friction Coupling.—Judson Mattison, Oswego, N. Y.:

What I claim as my invention and improvement in friction couplings for shafting and machinery, is the use and application of vulcanized india-rubber, as an elastic friction substance to be used in the manner and for the purpose specified.

I also claim the construction and arrangement of the oil vessels or canals, S and V, with their drains or holes, T and Z, for the purpose set forth and described.

53,847.—Soap.—Nathaniel Ridley Eaves Mayer, Chester C. H., South Carolina:

What I claim in the composition in washing clothes, and other articles prepared substantially as described for the purpose set forth.

53,848.—Corn-Stalk Cutter.—George D. McClure, Denver Station, Ill.:

I claim an improved corn-stalk cutter, constructed and arranged substantially as described and for the purpose set forth.

53,849.—Apparatus for Stripping Corn from the Cob for Table Use.—William E. McGill, Cincinnati, Ohio:

I claim the combination of the spike plate with the sheller, operating substantially as and for the purpose herein set forth.

53,850.—Harrow.—Anthony Mero, New Haven, Mich.

First, I claim the construction of the bridge bar, B, with slotted and forked ends adapted for receiving and serving as bearings for the central turning posts, b b, of the harrows, substantially as described.

Second, The combination of the forked drag bars, C C, with the forked bridge bar, B, and the central posts, b b, substantially as described.

Third, The combination of the seat, E, with the forked bridge bar B, and rotary harrows, A A, substantially as described.

53,851.—Cotton Bale Tie.—Isaac H. Merritt, Cincinnati, Ohio:

I claim the combination of the band, A, and key, C, when so arranged that the separated lugs of the single key shall detain the respective ends of the band, substantially as described and represented.

53,852.—Medical Compound for the Eye.—Granderson Mershon, M. D., Brookville, Iowa:

I claim combining the above-named substances in such proportions that the medicinal virtues of each are greatly increased, forming a specific for inflammatory diseases of the eyes.

53,853.—Bed Bottom Connection.—Frederick Metz, Lyons, N. Y.:

I claim the combination of the socket, D, with the head, E, and bearing, a, of the clasp or plate, C, said socket and head being provided with the groove and tongue, c c, or their equivalent and the whole arranged in connection with the slats, A, in such a manner as to allow them to turn to opposite positions, substantially as specified.

53,854. Spring Saddle.—John C. Miller, Louisville, Ky.:

I claim connecting the seat of the saddle separate from and independent of the bars of the tree, and hanging the said seat upon the ends of springs at a distance of several inches above the bars of the tree, all constructed as herein described and set forth.

53,855.—Machine for Seeding Raisins.—Samuel C. Moore, Boston, Mass.:

I claim the spiked or toothed cylinder, B, in combination with the grate or open frame cylinder, H, arranged to work together, substantially as described, for the purpose set forth.

In combination with the cylinder, H, I claim the scraper, t, arranged inside of the cylinder.

In combination with the toothed cylinder, B, I claim the prongs, , to removing the fruit from the teeth of the cylinder.

Also in combination with the toothed cylinder, B, I claim the rack of teeth, R, for removing the stones and seeds and pits from the teeth, Q.

53,856.—Farm Gate.—J. C. Murphy, Mendota, Ill.:

I claim a gate constructed substantially as described in combination with the wheel, e, track, d, hook, M, pulley, H, and inclined bars, a b, arranged and operating as and for the purpose specified.

53,857.—Loom. Ira Orndorff, Russelville, Ky.:

I claim, First, The changeable sectional pattern wheel when the sections are changed and held in place, substantially in the manner and for the purpose described.

Second, The adjustable cams arranged on the side of the disk as shown in Figs. 7 and 8, to change the shuttle boxes, substantially as and for the purpose set forth.

53,858.—Loom.—Ira Orndorff, Russelville, Ky.:

I claim, First, The combination of the changing shuttle boxes with the lay, arranged and operated substantially in the manner and for the purpose set forth.

Second, Changing the shuttle boxes of looms by a pattern cam and ratchet combined, arranged, and operating substantially in the manner and for the purpose described.

53,859. Awning.—J. A. Pain, Clyde, N. Y.:

I claim the arrangement of the jointed rod, i m n, the inclosed drum, d, and operating cord, p, substantially as described and represented.

53,860.—Threshing Machine.—Nelson Palmer, Hudson, N. Y.:

First, I claim the eccentric bolts, G, or their equivalents, to regulate the relations of the concave to the cylinder, substantially as set forth.

Second, I claim springs of rubber or other material when placed between the slats to give elasticity to the movements of the concave, substantially as and for the purpose set forth.

Third, I claim the board, H, when used substantially as and for the purpose set forth.

Fourth, I claim the board, H, when used in combination with the cylinder, A, and board, H, substantially as and for the purpose set forth.

53,861.—Method of Preserving and Drying Green Corn on the Cob. David Parker, Shaker Village, N. H.:

I claim the drying and preserving of green or unripe corn on the cob, by first scalding or partially cooking it, and then drying it rapidly by artificial heat in ovens or drying chambers, until all the moisture is driven off from the grains and cob, substantially as herein described.

53,862.—Harvester.—E. G. Passmore, Jr., Philadelphia, Pa.:

I claim, First, The sliding shaft, D, its bevel wheel, L, gearing into a wheel, L', on the rake shaft in combination with the gearing herein described, or equivalent to the same, for operating the cutters, the whole being arranged for the simultaneous stopping and starting of the cutting apparatus and rake, substantially as herein described.

Second, The studs, g, made adjustable on the arms, N, and adapted to the flanged cam, substantially as and for the purpose specified.

53,863.—Knife and Fork Scourer.—R. R. Patterson, Springfield, Ill.:

I claim, First, The scourer, I, or its equivalent hung within a frame or holder having suitable handle for moving the same, in combination with the bed, B, upon which the knives or forks are laid, when arranged together, substantially as and for the purpose specified.

Second, In combination with the above I also claim the perforated receptacle or reservoir, a, for the scouring material when secured to the scourer or its holder, in such a manner that as it moves over the knives or forks, it will throw the scouring material upon the same, substantially as described.

[This invention relates to a novel and useful implement for the scouring and cleaning of knives and forks, whereby they can be scoured with the utmost dispatch and in a most satisfactory manner.]

53,864.—Feed Water Apparatus.—James H. Pease, Reading, Pa.:

I claim, First, The arrangement of the injector of a locomotive or other boiler in combination with the feed pipe of its force pump, when such pipe has a suitable stop cock for opening or closing the communications through the same, substantially as and for the purpose specified.

Second, The combination of the feed pump and the injector whereby to supply water to a locomotive or other boiler by one set of pipes and connections, substantially as herein described.

Third, The stop cock in combination with the discharge orifice of the injector overflow, for the purpose specified.

53,865.—Saponifier.—Henry Pemberton, Alleghany, Pa.:

I claim the use of the aluminates of soda or potassa, either with or without admixture of the hydrates of those alkalies in the manufacture of saponifier or concentrated lye, substantially in the manner hereinbefore described.

53,866.—Buckle.—L. W. Perkins, Beloit, Wis.:

I claim, First, The frame, A, and lever, B, constructed and arranged to operate in the manner and for the purposes herein set forth.

Second, The removable strip, e, in combination with the jaw, D, and lever, B, for the purpose of adjusting the jaw, as described.

Third, I claim making the faces of the jaws, C' and D corrugated or roughened for the purpose of holding the stop more securely, as set forth.

53,867.—Cultivator.—George Perry, Muscatine, Iowa:

First, I claim the adjustable beams, C C, in combination with the slotted cross bar, A, and the slotted braces and notched latches, M M, substantially as and for the purposes set forth.

Second, I claim the foot levers, G G, in combination with the supplementary frame, substantially as and for the purposes set forth.

Third, I claim the buttons, O O, attached to the frame, D D, and rigidly securing the supplementary frame either up or down when desired, substantially as and for the purposes set forth.

Fourth, I claim the levers, H H, and the parallel bar, I, in combination with the hinged standards of the interior shovels and oscillating beams, C C, the latter being also adjustably attached, substantially in the manner and for the purpose set forth.

Fifth, I claim the mode of attaching the standards of the interior plows by the jaws, L L, to the beams, c c, substantially as and for the purposes set forth.

Sixth, I claim a hinged shovel attached to the standard by a wooden pin, substantially in the manner and for the purpose set forth.

53,868.—Machine for Grinding Clay.—Benjamin Porter, Jackson, Mich.:

I claim in combination with the central grinding shaft, G, and box, D, I claim the auxiliary grinding shafts, H H, substantially as described.

I also claim the cleats or pieces, d d, on the inside of the box, substantially as described for the purpose set forth.

I claim the combination and arrangement of the rock shafts, T T, arms, U U, slides, V V, arms, X X, and cam, a, to push out the molds when required.

53,869.—Machine for Catching Sheep and other Animals.—Robert Ralston, Kalamazoo, Mich.:

First, I claim the jaws, being held distended by the brace or its equivalent, preparatory to its being fastened upon the leg.

Second, The points of the jaws passing each other, thus allowing them to fit closely to the leg of a small or large animal.

Third, The combination and arrangement of the machine, substantially as and for the purposes set forth.

53,870.—Sash Fastener.—John C. Rankin, Mount Vernon, N. Y.:

I claim the slatted plate, B, and the slide, E, or their equivalents, applied to the sashes of a window, substantially as described.

I further claim the slide, E, with its notches, d d, spring, F, and button, e, box, C, and the plate, B, provided with the vertical slot, a, and cross slot ail, arranged and applied to the sashes, substantially as described.

53,871. Locomotive Head Lights.—Thomas S. Ray and Samuel E. Cleveland, Buffalo, N. Y.:

First, In a locomotive head light lamp for burning petroleum or coal oil, having a cylindrical wick tube, a top shield and deflector, so constructed and placed upon the wick tube as to form a combustion chamber above and around the base of the flame, we claim a circular opening made through the shield and below the deflector for the purpose of admitting air directly to and slightly below the base of the flame, substantially as described.

Second, In a locomotive head light lamp having a cylindrical wick tube, we claim having the bottom of the wick tube open so as to admit the air free and unobstructed into the wick tube to supply the inside flame in combination with an outside case which admits air through perforated openings in its bottom, or through openings which cause the air to take an indirect route in its passage into the case, for the purpose and substantially as described.

Third, In a locomotive head light lamp having a cylindrical wick tube and a shield or cap around the top of the burner, we claim a free unobstructed and direct passage for the air through the shield to the outside base of the flame, in combination with perforated openings through the bottom of the case, or with openings which cause the air to take an indirect route into the case, for the purpose and substantially as set forth.

Fourth, We claim the combination of a cylindrical wick tube left free and open at the bottom for admitting air to the inside of the flame, with a deflector placed on the top of the wick tube for deflecting the air to the outside of the flame, substantially as set forth.

53,872.—Harvester.—Owen Redmond, Rochester, N. Y.:

I claim engaging the gearing with, and disengaging it from the driving shaft, C, by means of the loose sleeve, b, double couplings, d d', springs, e e', and turning sleeve, a, the whole arranged, combined and operating substantially as and for the purpose herein set forth.

I also claim the combination of the connecting bar, K, and

standard, I, with the finger beam, G, the bar being jointed at s, and the standard forming a stiff connection wi h the finger beam, or an extension thereof, and the whole being so arranged that a simple lifting of the finger beam will elevate its outer end to a greater degree than its inner end, substant al y as described.

I also claim the wedge slide, o, in combination with the heel projection, q, of the finger beam, for the purpose of stiffening and sustaining the latter before it is raised, substantially as described.

I also claim the combination, of the slide, o, rock lever, N, lever, L, and link, u, whereby the slide is first pressed forward to stiffen the finger beam and the latter is then raised, substantially as specified.

I also claim supporting the shoe, Q, by the grasp wheel or truck, T, in combination with making said shoe adjustable higher or lower by the screw, h', resting on the shank or bearing, g', of the wheel, the whole arranged, combined and operating substantially as set forth.

53,873.—Evaporator.—David Reeves, South Pass. Antedated April 7, 1866:

First, I claim the employment or use, in a sugar-evaporating pan, of a bottom, F, and partition, E, arranged in such a manner that a communication may be formed between the several compartments, and the communication cut off when desired, by the moving of the bottom in contact with and from the lower edges of the partitions, substantially as specified.

Second, The packing, a, inserted in the lower edges of the partitions, substantially as and for the purposes set forth.

[This invention relates to an improved means for transferring the juice from one compartment of the pan to another, whereby the scum is not allowed to incorporate with the body of the juice or sirup during said transfer; and also to an adjustable throat or damper placed in the flue, and arranged in such a manner as to graduate the heat under the finishing compartment as occasion may require.]

53,874.—Fliers for Spinning.—George Richardson, Lowell, Mass.:

First I claim the elliptical form and semicircular shape of the arms, b, as herein specified, and for the purpose set forth.

Second, I claim the headless bobbin, d, in combination with a flier, constructed as herein described.

53,775.—Mariner's Compass.—Edward S. Ritchie, Brookline, Mass.:

I claim the combination of the annular float and one or more magnets, and the encompassing case or cases thereof.

I also claim the combination of the divisional ring, the annular float, and one or more magnets, and the encompassing case or cases thereof.

I also claim the arrangement of the divisional ring and the annular float, so that the ring may make a part of the hollow float.

I also claim the arrangement of the divisional ring in another respect, viz., so as to incline to the plane of the magnets, the same being substantially as and for the purpose hereinbefore explained.

I also claim the combination as well as the arrangement of the two magnet cases, the bearing carrier, and the divisional ring, or the same and the annular float.

53,876.—Churn.—Frank J. Robinson, Laconia, N. H.:

First, I claim the construction of the dasher with inclined radial plates, h h, and vertical tubes, g g, substantially as and for the purpose herein specified.

I also claim the combination of the central opening, p, for the ingress, and the tubes, n n, for the egress of air, in combination with the dasher, for the purpose set forth.

53,877.—Provision Safe and Table.—Jonathan S. Robinson, Baltimore, Md.:

I claim the combination of the safe, A, and table, B, when constructed and operating as described.

53,878.—Horse Hay Fork.—L. M. Roby, Leesville, Ohio.:

First, I claim the combination and arrangement of head bar, A, constructed as described, with the tines, B, secured as specified and with bale posts, C, bale, D, trigger post, E, and adjustable trigger, K, substantially as, and for the purposes set forth.

Second, The trigger, K, constructed as described, in combination with arm, b, screw, i, spring, x, and tooth, s, substantially as and for the purpose set forth.

53,879.—Brick Machine.—T. H. Rodgers, Chicago, Ill.:

I claim, First, The main frame, A, provided with the mold, in combination with the plunger, D, and levers, F and G, arranged and operating as and for the purpose set forth.

Second, In combination with the above described parts, I claim the shaft, H, provided with the lever, J, and connecting rod, I, for operating the press, as described.

Third, In combination with the press constructed as described, I claim the lever, b, for elevating the plunger, D, and removing the brick, as shown and described.

53,880.—Fireplace.—Francis M. Rogers, Cincinnati, Ohio:

I claim, First, In the described combination, the back, G, crown plate, I, and damper, K, forming a smoke-consuming and reverberating chamber, J, throat and direct exit, substantially as set forth.

Second, I claim the series of ash flues, l, arranged as described, in combination with the direct exit flue, for the purposes set forth.

53,881. Revolving Fire-arm.—Sylvester H. Roper, Roxbury, Mass.:

I claim, First, The combination of revolving carrier, the piston, the hammer, and the connecting link, G', arranged and operating substantially as described.

Second, I also claim the inclined plane, v, on the end of the piston, in combination with the inclined plane, u, on the head of the hammer to lock the hammer, as described, whether used in combination with a revolving carrier or a stationary cartridge bed.

Third, I also claim the double-acting spring, H, constructed and arranged as described, in combination with the ratchet wheel, E, and the eccentric slot, s, as and for the purpose described.

Fourth, In combination with the double-acting spring, H, the ratchet wheel, E, and the eccentric slot, s, I also claim the thumb screw, t, as and for the purpose described.

Fifth, I also claim connecting each end of the main spring to the hammer by a separate stirrup, arranged and operating as described.

Sixth, In combination with the cylindrical case, B, and its cover, d, I also claim the yielding spring, e, as and for the purpose described.

53,882.—Vegetable Slicer.—Christian Rosenburg and Warren Tamer, Chicago, Ill.:

We claim the slicer herein described, composed of the bed, A a, with the double side pieces, B1 B2 C1 C2, and adjustable holes E F, adapted to receive knives of different sizes and hold them at various hights, substantially as and for the purpose herein set forth.

53,883.—Molding and Casting Apparatus.—George Ross, Newport, Ky. Antedated October 18, 1865:

I claim First, The vertical pipe mold drying oven, herein described, arranged with separate and distinct communications with the molding and casting pits, as and for the purpose specified.

Second, The described, or equivalent, consecutive arrangement of receiving pit, A, molding pit, B, oven C, and casting pit, D.

Third, The combination of the two cranes, F and G, with the molding pit, B, oven, C, and casting pit, D, arranged substantially as specified.

Fourth, The skids, H H, arranged in the described combination with cranes, F and G, and continuous pit, A B C D.

53,884.—Holder for Chisels.—John Russell, Sing Sing, N. Y.:

I claim clamping the chisel between two disks of india rubber or gutta percha, by means of the set screw, D, or its equivalent, substantially as and for the purposes set forth.

53,885.—Apparatus for Separating the Precious Metals from other Substances.—Van Buren Ryerson, New York City:

I claim the pan with the bottom formed with recesses, substantially of the form herein described, in combination with the means or the equivalent thereof, for giving reciprocating motions, substantially such as described.

53,886. Stovepipe Damper.—Rufus S. Sanborn and William Bennett, Ripon, Wis.:

We claim the metallic plate, A, with the funnel-shaped tube, B, when arranged in the manner substantially as and for the purposes herein specified.

53,887.—Manufacture of Molasses.—George W. Sayre, Pisgah, Ohio. Antedated March 25, 1866:

I claim the arrangement, construction, and combination of the steam boiler D, sirup pan, E, and dome, F, with condensing pipes, H J and K, and water tank, P, as herein described, and for the purposes herein set forth.

63,888.—Bed Bottom.—Frederick Schimming, Philadelphia, Pa.:

I claim the sacking or bed bottom, the straps, l l, and the springs, e e, arranged substantially as herein specified and described.

53,889.—Watchman's Register.—Ph. Louis Schmandt, Hoboken, N. J.:

I claim the use and employment of the point, N, or an equivalent moving part of a clock in combination with the lid or dial cover, C, where a mark of the the time by a motion of the lid, c, is produced on said lid.

53,890.—Lamp Snuffer.—Karl Schou, Lafayette, Ind.:

I claim an improved lamp snuffer, constructed and operated substantially as herein described, in combination with a lampwick tube, for the purpose set forth.

[The object of this invention is to furnish an instrument for snuffing and trimming lamp wicks, both when the lamp is burning and when extinguished, and it consists of a pair of blades, which, by pulling upon the end of a wire projecting from the burner, are made to close upon each other above the end of the wick tube, trimming the wick evenly.]

53,891.—Plow.—S. F. Seely, Sylvania, Ohio:

I claim the curved or semicircular rear part of the beam, A, and front part of the plow or land side, B, substantially as shown, to operate upon weeds, trash, etc., and prevent the same from choking or clogging up the plow, as set forth.

The semicircular coulter, D, in combination with the semicircular rear end of the beam, substantially as and for the purpose specified.

The subsoil plow, E, having a curved standard, E, pivoted to curved bars, G H, the front ends of which are pivoted to the land side at elevated points, to operate in the manner substantially as and for the purpose herein set forth.

[This invention relates, first, to a new and useful improvement in the construction of the plow and the coulter for the same, whereby the plow is prevented from becoming choked np or clogged with weeds and trash which are very liable to collect in front of it during the operation of plowing. Second, to a new and improved subsoil plow attachment, so constructed, arranged, and applied that it will have a tendency to penetrate the earth as the plow is drawn along, and to break up and loosen the soil at the bottom of the furrow made by the surface plow, and at the same time not be liable to break in the event of coming in contact with stones or other obstructions.]

53,892.—Means for Operating the Pickerstaff of Looms. Peleg A. Sherman and Freeman Baxter, Pawtucket, R. I.:

We claim the inclined slotted guide, J, as set forth for communicating the desired motion to the hook, E, or whatever instrument or device is used to convey the weft through the warp.

We claim the guide, J, and the lever, A, connected to the brace, F, by the stud, B, in combination with the rod, C, and pickerstaff, D, as and for the purpose set forth.

53,893.—Broom Head.—Samuel S. Sherman and Jeremiah G. Sherman, McHenry, Ill.:

We claim fastening the broom corn or other material into the broom head, by forcing keys or wedges through slots in said head, substantially as herein shown.

The slots, a b, the keys, p, the cross bars, b, and ledges, c, when arranged and operating substantially as herein shown.

53,894.—Door for Puddling and other Furnaces.—Nathaniel L. Libby, Boston, Mass., and Benjamin Shiverick, Waltham, Mass.:

In combination with an iron door we claim a lining of calcined plaster, gypsum, or other material which conducts heat slowly, made either solid or with an opening or air space, as may be preferred.

We claim a nose piece or guard around the hole in the door made separate from the door and fastened to it.

We claim making the lining of the door to cover and protect, or partially cover and protect the nose piece or flange around the hole in the door, substantially as described.

We claim in furnace doors a lining made of plumbago or crucible material, to protect the door and intermediate lining from intense heat.

We claim the combination and arrangement of the iron plate, A, lining, J, and lining, K, substantially as described.

We claim making the lining of furnace doors in one piece of white clay fire brick crucible material.

We claim fastening the lining to the iron plate by the bars of metal, L L, substantially as described.

We claim the holes in the door in combination with the lining for the purpose specified, substantially as described.

53,895.—Rectifying Apparatus.—Thomas Simmons, Chicago, Ill.:

I claim the combination and arrangement of the reservoir, A, the receiver, B, the connecting pipe, C, provided with the stop cock, D, or its equivalent, and the steam pipe, L, arranged and operating as and for the purposes specified.

I claim the combination and arrangement of the reservoir, A, the perforated chamber, P, the receiver, B, connecting pipe, C, and steam pipe, L, operating as and for the purpose set forth.

53,896.—Annular Auger.—Robert Stewart, Elmira, N. Y.:

I claim making the thread of a hollow auger with openings, c, substantially as and for the purposes set forth.

Revolving each outer hollow auger in a reverse direction from its next inner hollow auger, substantially as and for the purposes set forth.

Arranging a series of hollow augers so that the rear end of each auger shall project sufficiently beyond the next larger auger to turn as its own shaft in independent journal boxes, substantially as and for the purposes set forth.

53,897.—Buttonholes for Paper Collars.—Daniel Stoner, Chicago, Ill.:

I claim the combination in a buttonhole for card board paper collars and cuffs, or collars and cuffs of any similar material, of the enlargements, A and B, proportioned as specified, and the peculiarly constructed slit connecting the same, all arranged and operating substantially as specified and shown.

53,898. Lamp Cleaner.—Edmund F. Sutton, New York City:

I claim the elastic self-adjusting wiping finger on one side of the stick or shaft, in combination with the fixed wiper on the opposite side of the stick or shaft, the two operating together, substantially as herein specified.

53,899.—Planes for Making Blind Slats.—Enoch K. Thomas, Rock Island, Ill., and Hans H. Andreson, Davenport, Iowa:

We claim the construction of a cutter for producing slats with one or two cutting edges, and opening through the shank of the cutter for the passage of the slats, substantially as described.

The combination of one or more slat cutters, constructed substantially as described, with a plane stock having its sole stepped, substantially as set forth.

53,900.—Exercising Machine.—T. P. Thorpe, New York City:

I claim making use of wire, or its equivalent, for the seat, E, the rods, N, the springs, C C, the base or foundation, A A A, and the feet, B B B B, as herein formed or combined and described, and for the purposes herein mentioned.

I also claim the toy horse or balance weight marked, P, and sliding on rods, N N, as described for the purposes herein mentioned.

53,901.—Cotton Picking Machine.—A. Tieusch, Memphis, Tenn.:

First, I claim the employment of rotary brushes, or their equivalent, substantially as described, for the purpose of gathering cotton from the plants.

Second, Mounting a series of movable brushes upon a carriage in such manner that upon moving the carriage over rows of cotton plants said brushes will draw the cotton from the pods and deliver it in the machine, substantially as described.

Third, The combination of movable and stationary combs, k l, or their equivalents, with rotary brushes which are adapted for gathering cotton from the pods, substantially as described.

Fourth, Providing the movable combs, l, with clearers, p, or their equivalents, substantially as described.

Fifth, The combination of a slotted or open guard plate, E, with a series of brushes adapted for picking cotton from the pods, substantially as described.

Sixth, The hinged doors, D D', forming the upper and lower sides of a cotton receiver, in combination with the devices for gathering cotton from the pods, substantially as described.

Seventh, Locating the driver's seat, P, in such relation to the cotton receptacle that the driver can see when this receptacle is filled, and also manage the horse drawing the machine.

Eighth, Constructing the sides, A A, of the carriage body so as to form side guards on each side of the gathering part of the machine, substantially as described.

Ninth, Providing for adjusting the brushes and securing them at any desired hight according to the hight of the cotton plants, substantially as described.

Tenth, The hinged brace, M, and tongue, I, applied to the carriage of a cotton picker or gatherer, substantially as described.

Eleventh, The combination of an adjustable seat, P, with contrivances which will admit of the adjustment of the front part of the machine, substantially as described.

53,902.—Propeller Wheel.—Thomas Tripp, Chicago, Ill.:

I claim constructing the blades of a propeller screw with two reversed curves which shall be arcs of the two circles last above described, as and for the purposes specified and shown.

53,903.—Furnace Grate Bars.—George O. Tupper, New York City:

I claim the furnace grate bars, the rib or lower part of which is corrugated longitudinally, with one or more corrugations on each side, substantially as herein described, and for the purposes set forth.

53,904.—Grain Hoisting Apparatus.—Otis Tufts, Boston, Mass.:

I claim the transversely movable valve seats, k, in combination with the pulling shaft, o, and rack and pinion, m m, or equivalent, for the purpose of stopping, starting, regulating the speed, and reversing the direction of motion in grain hoisting apparatus, substantially as represented.

I claim, in combination with a hoisting apparatus, and more particularly with the starting and stopping cord or rod thereof, of a closed vessel filled with liquid, and provided with a piston, when such cord or rod is arranged, as by movement imparted thereunto, to open or close apertures which will by allowing the liquid to pass the piston permit motion of the hoisting apparatus, or by preventing the liquid from passing, the piston will stop the hoisting apparatus, and hold it from moving substantially as described.

I claim the combination with the stopping and starting cord or rod of a hoisting apparatus, of the valves of a liquid stop apparatus, and the steam valve or movable seat of the steam engine motor, operating substantially as described.

53,905.—Percolator.—P. H. Vander Weyde, Philadelphia, Pa.:

First, I claim the method herein dhscribed of making extracts and for filtering purposes, which consists in dividing the column or vessel to contain the material to be extracted or filtered, into a series of horizontal layers or divisions, which by suitable mechanical means may be moved upward, so as to allow the addition of the fresh materials to the bottoms, and its removal from the top when extracted, substantially as described.

Second, I claim the manufacture of artificial bone black from wood charcoal, and its use for filtering purposes, either alone or mixed with compounds of lime or magnesia.

53,906.—Water Wheel.—Henry Van Dewater, Buffalo, N. Y.:

First, I claim the cycloidal buckets, c, applied to the wheel in connection with the inclined flange, b, at the top of the wheel, and the band, B, at the outer edge of the lower part of the buckets, provided with an inner inclined or beveled surface, substantially as set forth.

Second, Constructing the cylinder, A, of the wheel with a horizontal partition, a, in connection with openings, h, made in said cylinder below the partition and the chamber, D, in which the wheel shaft, C, is stepped, substantially as and for the purpose specified.

53,907.—Sash Supporter and Fastener.—Isaac H. Wait, Otisco, Mich.:

I claim combining with an overpoised lever, B, pivoted to the window frame and having a permanent hook or jaw, c, upon it, a second pivoted hook or jaw, i, and so made as that one or both of said hooks may act in connection with a holder or holders, f f, on the sash, substantially in the manner and for the purpose herein described and represented.

53,908.—Trunk Hinge. William Wakensham and Theodore A. Dunham, Newark, N. J.:

I claim a hinge for trunks, chests, and other articles provided with lids having cleats or "valances" attached constructed in angle form so as to extend or lap over the ends or sides of the trunk or other article and the end or side "valances" of the lid, substantially as herein shown and described.

53,909.—Seeding Machine.—Z. D. Waters, Brookville, Md.:

First, I claim the arrangement of one or more seed cups within a hopper box, F, in such manner that said cup or cups shall elevate the seed above the bottom of the hopper and discharge the seed into a funnel, g, which conducts it out of the hopper, substantially as described.

Second, Conducting the seed and fertilizer from two funnel hoppers, g g', into an inserted funnel-shaped guard, G, substantially as described.

Third, The construction of the seed or fertilizer hopper of a cylindrical chamber, b, communicating with an upper receiver through slotted opening, d, substantially as described.

Fourth, The combination of the elevated receiving hopper, g, with the cylindrical vessel, b, and one or more revolving seed elevators, substantially as described.

Fifth, The conical hooped scatterer, I, arranged beneath the discharging apertures of the hoppers, g g', and surrounded by a conical skirt or guard, G, substantially as described.

Sixth, Extending the upper ends of the receiving hoppers, g g', above the plane of the apertures, a a, leading into the cylindrical chambers, b b, substandially as and for the purposes described.

Seventh, Providing for discharging seed or fertilizing substances, or both, from a hopper by means of revolving elevators or cups which are entirely inclosed within said hopper, substantially in the manner described.

Eighth, Attaching the coverers, m m, to a forked standard, which is constructed substantially as described.

53,910.—Cotton Gin.—Joseph Watrous, Jr., Mystic River, Conn.:

I claim in combination with the slide frames the removable side casings and deflecting boards, arranged as described.

53,811.—Cultivator.—Edward P. Wheeler, Nebraska City, Neb. Ter.:

First, I claim the arrangement of the levers, F, pivoted standards, L, and plow beams, D, as described.

Second, I claim pivoting the levers, F, and standards, L, to the plow beams by means of the longitudinally arranged pins or rods, p, as and for the purposes shown and set forth.

Third, I claim providing said levers when arranged with the standards, L, as set forth, with the knee rests, l, as and for the purposes specified.

Fourth, I claim the combination of the hinged beams, D, standards, L, levers, F, and hooks, d, arranged as described and shown.

Fifth, In combination with the beams, D, and standards, L, I claim the arrangement of the adjustable standard, P, and cross bars, Q R, as described.

Sixth, I claim the combination of the cross marking bar, T, provided with shovels, V, with the drags, J, for the purpose set forth.

Seventh, I claim the combination and arrangement of the standards, L, P, the levers, F, beams, D, cross bar, H, and brace, I, when arranged, so as to render said standards, L, rigid, for the purpose of plowing in grain, as shown and specified.

53,912.—Churn.—Edwin P Whitcomb, Coldwater, Mich.:

I claim the combination of the frame which supports the gearing, the reverse motion, diamond-shaped right-angle blades, or beaters, as described, with the space or water chamber which surrounds the churn substantially as herein set forth.

53,913.—Manufacture of Candy.—H. C. Wilkins, Albany N. Y.:

I claim the composition of matter above described for the manufac

ture of candy, together with the process of making the same, substantially as set forth in the specification.

53,914.—Transmitting Power.—Jacob Woolf, Burr Oak, Mich.:

I claim the shaft, B, the arms, G G, with the shafts, H H, and weight boxes, K K, arranged substantially as described, and operating either by pulleys, E, E and I I, and belts, or by toothed gearing, or by any devices to accomplish the same end, so as to cause the weight, K, or their equivalents to be thrown out of balance in such a manner, that one shall be constantly further from the axis of the shaft, B, than the other, and thereby aid it in its revolution, as and for the purpose set forth.

53,915. Rotary Engine.—Henry J. Behrens (assignor to himself, Henry C. Dart, and Edward Dart), New York City:

First, I claim the concentric fixed hubs, recessed substantially as described, in combination with the two-geared shafts, their attached pistons and the cylinder, substantially as herein set forth.

Second, The pistons attached to the facing sides of the two disks, secured to their respective shafts, and so arranged that the piston or pistons of one shaft work against the face of the disk of the other shaft, substantially as herein described.

53,916.—Hame for Horse Collars.—John E. Brown (assignor to himself, Charles A. Mott, and A. A. Peebles), Lansingburgh, N Y.:

First, I claim the adjustable collar, B, arranged with the spring, d g, and the spring, f, in combination with the holes, b, in the plate, a, at the outer edge of the hame, substantially as and for the purpose set forth.

Second, The loop, E, bent in right angular form, notched at its rear or outer end, and secured to the hame by the eyes, g, to admit of the eye, j, of the trace strap being adjusted higher or lower in the loop, and retained as adjusted by the pole straps, substantially as shown and described.

53,917.—Baling Press.—J. B. Gridley, Louisville, Ky.:

First, I claim in a baling press, the levers, G G, having their inner ends applied to or near the center of the follower, in combination with hangers, rods or bars, I, which afford the fulcra for said levers, and a rope, chain or other draught device, whereby the loose ends of the levers are made to approach each other, substantially as and for the purposes herein specified.

Second, In combination with the levers which are made to act upon the follower, by having their loose ends moved toward each other, and which have their fulcra upon hangers, rods or bars, I claim a rope chain or any other device which shall impart motion to the follower, before the levers attain their effective acting position, substantially as and for the object set forth.

Third, I claim the means substantially as herein described, for adapting the levers, in assuming the position from which they act, to stand at the definite angle with the hangers or rods, I, from which they may be most speedily made to take the position in which to act, effectively upon the follower, said means, consisting either of the widening of the levers at the points where the hangers or rods are attached, or in the application of the metallic blocks, H, or their equivalents.

Fourth, I claim the combination with the levers, G G, hangers, I I, and rope, K, of the follower C, D, ribs, d', and guide slots, a, the latter being adapted to prevent the tilting or canting of the follower, in its movements through the press-box, as explained.

Fifth, I claim the particular manner of constructing the point which connects the levers with the follower, to wit: by means of the three parts, E F F, connected by a single pintle, e, as herein described.

Sixth, I claim the metal blocks, H H, attached to the levers, G G, and provided with hooks, f f, and guides, d', to which hooks, f f, the rods, I I, are connected, substantially as and for the purpose herein set forth.

53,918.—Metallic Fastening for Plow Beams.—Lewis Gibbs (assignor to Bucher, Gibbs & Co.), Canton, Ohio:

I claim a metallic fastening for uniting a plow beam and handle, made with lugs, flanges and recesses, and united thereto in the manner and for the purpose herein described and represented.

53,919.—Coffer Dam.—Aaron Filmore (assignor to himself, B. H. Austin, Jr., and Adolphus S. Austin), Buffalo, N. Y.:

I claim a portable coffer dam, A, (with or without a movable end piece, A2), for the purpose and substantially as described.

53,920.—India Rubber Hat and Cap Band.—William H. Halsey, Hoboken, N. J., assignor to David W. Mapes, Orange, New Jersey:

I claim the combination of the two rollers, with their surfaces prepared as described, one roll having a sunken or depressed, and the other an elevated surface, substantially as, and operating as and for the purposes set forth.

53,921.—New Article of Manufacture from Hard Rubber, to be used in Articles of Dress.—William H. Halsey, Hoboken, N. J., and Maurice Fitzgibbons, New York City, assignors to David W. Mapes, Orange, N. J.:

We claim as a new article of manufacture, hard rubber or gutta percha, or similar material, ornamented by being subjected to two or more successive pressures or impressions of figured rolls, substantially as above described.

53,922.—Hard Rubber or Gutta Percha for Articles of Dress and other use.—William H. Halsey, Hoboken, N. J., and Maurice Fitzgibbons, New York City, assignors to David W. Mapes, Orange, N. J.:

We claim the process herein, substantially as described, which consists of subjecting hard rubber, gutta percha, or other similar material, to two or more successive pressures of figured rolls, substantially as and for the purposes above described.

53,923.—Stencil Brush.—Daniel K. Herr, Locust Valley, Pa., assignor to Theodore W. Herr, Lancaster, Pa:

First, I claim the combination of the brush tube, G, and the external casing, B, constructed and operating substantially in the manner and for the purpose specified.

Second, The brush, J I, when expressly made or adapted to my brush tube, G, and to be used in combination with the external casing, B, in the manner and for the purpose set forth.

53,924.—Nail Plate Feeder.—C. D. Hunt, Fairhaven, Mass., assignor to the American Nail Machine Company, Boston, Mass.:

I claim the combination and arrangement of the double rack bar, K, the pawls, I I, the lever, G, the spring, M, and the cam, H, as applied to the vibratory arm, A, and the shaft, E, substantially as specified.

53,925.—Stovepipe Damper.—Sumner Marvin (assignor to himself and Alfred W. Boynton), South Royalston, Mass.:

I claim the damper apparatus, composed not only of the frustum, A, having the opening, b b, but of the two dampers, C, D, and their connecting rod, E, made and arranged together, and with a flue or pipe, B, substantially as specified.

53,926.—Eyeleting Machine.—Andrew A. Reed, North Bridgewater, Mass., assignor to Elmer Townsend, Boston, Mass.:

I claim the combination of the stationary work-supporting surface, the punch, and the setting mechanism, when the latter is arranged to feed the eyelet laterally to, or under the hole punched for its insertion, substantially as described.

I also claim the construction by which the eyelet is removed by the feed pin, directly from the magazine, without the intervention of a chute or roadway, substantially as described.

I also claim the combination of a stationary eyelet magazine, with a rotating ring, provided with pockets, into which the eyelets are thrust, substantially as described, and from which they are removed by the feeding instrument, substantially as set forth.

53,927. Sewing Machine for Sewing the Sweat Linings to Hats.—Frederick S. Sanford and Dwight Wheeler (assignors to Glover Sanford and Sons, and Dwight Wheeler), Bridgewater, Connecticut:

We claim the work plate, D, guides, E and F, constructed and arranged substantially in the manner described, in combination with a stitching apparatus, for the purpose specified.

53,928.—Detaching Bouts from Davits.—E. H. Sheffield, Stonington, Conn., and E. P. Palmer (assignors to E. H. Weston), New York City:

We claim the jointed hooks, c, fitting into sockets, d, on the ends of a boat, A, in combination with the retaining hains, f, and with suitable mechanism for tightening or releasing said chains, constructed and operating substantially as and for the purpose described.

53,929.—Harvester Rake.—Thomas Taylor (assignor to Samuel C. Ridgeway and John Fox), Baltimore, Maryland:

I claimed the combined action of the crank shaft and curved arm of the rocker, moving in the swiveled guide for giving motion to, and operating the raker, as herein recited.

53,930.—Horse Shoe.—Cassius M. Werner (assignor to himself and Edwin A. Bigelow), Rockford, Ill.:

First, I claim forming the clasps with open loops, as and for the purpose described.

Second, Casting the clasps in one piece with the flange bar, as described, for the purpose set forth.

Third, The combinat on of the sole, the ribs, the flange bars and the clasps substantially as described.

53,931.—Artificial Leg.—James W. Weston and Frederick Buckner, New York City, and Reinhold Boeklen, Brooklyn, N. Y., assignors to James W. Weston New York City:

First, We claim an ankle joint formed by a spring of rubber or other suitable material, provided with recesses in its top and bottom surfaces, in combination with corresponding projections on the foot and limb, substantially as specified, so that the foot is allowed a limited motion in any direction, but is brought properly back to its place by said spring, as set forth.

Second, We claim forming the ankle joint spring in the manner specified, with the front portion thereof more rigid than the back portion, in order that the foot may conform to the surface stepped upon, as set forth.

Third, We claim a connecting bolt with rounded heads or nuts in combination with the elastic ankle joint, substantially as and for the purposes specified, and in combination therewith we claim the sheet-steel socket for the head, as set forth.

Fourth, We claim the elastic stop block or blocks applied as shown, to arrest the forward movement of the lower limb, as specified.

Fifth, We claim the hooks, H, formed of a bent piece of metal passing around the limb at the joint to strengthen the same, in combination with an elastic contractile band or spring applied between said hooks to throw the lower limb forward, as specified.

Sixth. We claim adjusting the limb to the conical shape of the stump by the lining of veneer or other suitable material, rolled up with the edges lapping and attached at the upper end to the artificial limb, in combination with the curved adjustable wedge, or its equivalent, as and for the purposes specified.

Seventh, We claim the conical filling pieces introduced into the artificial limb, as specified, to adjust the limb to the stump, as set forth.

53,932.—Saddle and Harness.—Achille Angeline, Genoa Italy:

First, I claim in the manufacture of cushions or pads for riding saddles, pack saddles, and harness of all kinds, of elastic substances, such as vulcanized gutta percha or caoutchouc when of the form and shape, substantially set forth.

Second, The formation of said elastic substances into tubes, double tubes, discs, knobs, or spheres, substantially as and for the purposes herein set forth.

53,933.—Rocket.—William Hale, London, England:

I claim the application of the principle by which the expansion of the whole volume of the gas as it issues from the vent is made to subserve the purpose of producing rotation in the rocket about its longitudinal axis, substantially as described.

53,934.—Steering Apparatus.—Morris West Ruthven, Middlesex County, England. Patented in England Nov. 10, 1864:

I claim in combination with a tiller operated by gears, pivoted levers and links, substantially as herein described, a weight or spring which reserves or stores the power with which the water forces the rudder in one direction, and is applied to aid the helmsman in putting the rudder over in an opposite direction, substantially as set forth.

53,935—Peat Machine.—James Hodges, Penny Hill, Bagshot, England:

First, I claim the pulping trough and separator, E F, provided respectively with the spider diaphragms, I, and fixed bars, K, and also provided with the shaft, G, having upon it the vanes, J, and bars, L, all arranged to operate in the manner substantially as and for the purpose set forth.

Second, The pulping and distributing trough, N, provided with diaphragms, c, having a varying number of arms, and also provided with valves, apertures, or slides, Q, at its bottom, and with a shaft, O, having vanes, P, upon it, arranged to operate substantially in the manner as and for the purpose specified.

Third, The combination of the screw excavators, elevator and pulping mechanism applied to a vessel, and arranged for joint operation, substantially as and for the purpose set forth.

Fourth, The preparing of the peat bed with subsoil drains, substantially as described, when used in connection with a vessel provided with an excavator and pulping apparatus, substantially as set forth.

53,936.—Rudder.—Morris West Ruthven, Middlesex Co., England. English Pat. July 11, 1863:

I claim in combination with a rudder composed of a series of hinged sections, the connecting of said sections at their upper ends by means of a slotted crank or lever on one part that receives in its slot a pin or anti-friction roll on the next adjacent part, and so on throughout the series, to cause the parts when moved by the rudder to assume an approximate curve, substantially as described.

53,937.—Sluice for Propelling Vessels.—Morris West Ruthven, Middlesex County, England. Patented in England May 1st, 1865:

I claim the employment in the propelling of vessels of rotating sluices such as are herein described, each in combination with two outlet passages, the sluice in each case being arranged to turn with its axis while the periphery and ends of the sluice are free as may be from contact with the inclosing surfaces of the chamber in which the sluice is contained, by which arrangement the sluice may be turned comparatively free from friction, and consequently requires but little power to turn it.

53,938.—Swing.—John F. Hartman, Fond du Lac, Wisconsin:

I claim the combination and arrangement of bar, B, and swing bars, D D, with the levers, E F G and H, and rope, I, substantially as and for the purposes set forth.

53,939.—Pump.—A. Leuchtweiss, Cincinnati, Ohio:

I claim the sharp-edged abutment, c, in combination with the discharge passage, a, screw, C, and cylinder, A, constructed and operating substantially as and for the purpose described.

REISSUES.

2,221.—Gang Plow.—N. F. Burton, of Galesburg, Ill. Patented Oct. 28, 1861:

First, I claim the device for adjusting the beams, A A', by means of plate, f, and clamps, e e, and bars, g g, substantially as set forth, whereby the depth of penetration of the plows, M and I, may be changed at pleasure.

Second, The combination of the subsoil plow, I, having a long-winged mold board, with the surface plow, M, arranged as and for the purpose set forth.

Third, The attaching of the axle, D, to the beams, A A', through the medium of the bail-shaped rod, L, in combination with the arm, H, attached to the axle, D, and having its bearing or fulcrum on the rod, L, as herein described, whereby the depth of the penetrator of both plows may be regulated at pleasure, and they may also be made to run out of the ground when desired.

2,222.—Lock.—Rudolph Vollschwitz and J. J. Schaepfer, (assignees by mesne assignments of F. Randolph) New York City. Patented July 25, 1865:

First, We claim a lock with a tubular case, B, containing a bolt, D, and one or more tumblers, E, to be operated from either side by a key, K, substantially as and for the purpose set forth.

Second, The latch, F, in combination with the bolt, D, and tubular case, B, constructed and operating substantially as and for the purpose described.

2,223.—Revolving Fire-Arm.—J. J. Greenough, New York City, assignee of James Warner, Springfield, Mass. Patented June 24th, 1856:

First, I claim the employment of a pin or other projection as described in the shield or rear frame for receiving recoil of the breech constructed as herein described, at a point just behind and in rear of a chamber that is on a line with the barrel when in position to be discharged for firing the arm, as and for the purposes above set forth.

Second, I also claim making the pin or projection, E, adjustable, substantially as and for the purposes set forth.

Third, I claim the cavities, I F, in the battery plate, c, in such position and of such form as to receive and hold the ball or balls in case of the accidental discharge of any of the chambers not in adjustment with the barrel, as described.

2,224.—Harvester.—Reuben Hoffheins, Dover, Penn. Patented May 20th, 1862:

First, I claim a sweep rake which is mounted upon the heel of the finger beam proper, or upon the inner front corner of the platform of a harvester which has its cutting apparatus and platform hinged to the draft frame, all in such manner that the rake arm sweeps the platform from front to inner side, and maintains a correct position in relation to the finger beam and platform during the rising or falling movements thereof on the joint or joints by which the finger beam is connected to the draft frame, substantially as set forth.

Second, A rake rotating upon an axis which is perpendicular to the top surface of the platform, or nearly so, and having its arms successively turned up, substantially as and for the purpose described.

Third, The angular rake arms rotated independently of the axis, f, and controlled substantially as described, in combination with a guide way which is perpendicular, or nearly so, to the said axis, f, of the rake head, substantially as and for the purpose described.

Fourth, Elevating and depressing revolving rake and reel arms by means substantially as described, whereby I am enabled to dispense with an inclined plane or cam way, as set forth.

Fifth, An inclined standard or support, F, or its equivalent, rigidly mounted upon a loosely-hinged platform or finger beam, and adapted for supporting a sweep rake in an unchanging position in relation to said platform without obstructing the free motion of the platform or finger beam, substantially as described and shown.

Sixth. A standard or support, F, which sustains the sweep rake above the draft frame or driving wheel thereof, said standard being mounted directly and wholly upon a hinged finger beam or the platform thereof, substantially as described and for the purpose set forth.

Seventh, A revolving toothed-head or crown wheel, J, constructed with supports for rake and reel arms, in pairs, said supports being arranged outside and around the axis of said wheel, J, substantially as and for the purpose described.

Eighth, In a harvesting machine which has its cutting apparatus hinged or jointed to the main frame in such manner as to allow it to conform at both ends to the undulations of the ground, and a rake mounted upon the said jointed cutting apparatus, or upon the platform thereof, I claim so constructing and arranging the several parts that the support of the rake can occupy a position outside of the inner drive wheel, B, or a position which is between the point of suspension, h, and the outer divider, G, and can also be hung, or be suspended below the draft frame, substantially as described.

Ninth, Effecting a combination of a rake and reel located substantially as described, and a finger beam and platform with the main frame, by means of a hinged draw bar, b, a hinged brace, I, a hinged suspender, f, and an extension bracket, 2, or their equivalents, substantially as and for the purpose described.

Tenth, The combination of a rake and reel, a yielding draw bar, b, inner shoe of the cutting apparatus and hinge-joint, e, on the draw bar, substantially as and for the purpose described.

Eleventh, Preventing a too sudden or abrupt deflection of a rake and reel mounted upon a hinged-joint cutting apparatus by carrying the point of suspension beyond the rake support, towards the centre of the draft frame by means substantially as described.

Twelfth, A continuously revolving rake which is mounted directly and wholly upon the platform or finger beam so as to rise and fall therewith independently of the draft frame, when said rake is located between the centre of the draft frame and the outer divider, and passes in at the front of the machine upon the platform and sweeps around to the inner side of the platform, substantially as described.

Thirteenth, The combination with a double hinged joint combined reaping and mowing machine, of a sweep rake which enters at the front of the machine upon the platform, in such manner that the rake and cutting apparatus rise and fall together while reaping; and also in such manner that the rake and platform may be readily removed and the cutting apparatus at the inner and outer ends allowed to float upon the ground and to accommodate itself at both ends to the undulations of the ground, substantially in the manner described.

Fourteenth, The combination of a suspended hinge joint cutting apparatus of harvesters and a combined rake and reel, which is mounted directly and wholly upon the suspended platform or hinged finger beam, substantially as and for the purpose described.

Fifteenth, Controlling the rake and reel arms by an upper and lower guide between which an attachment of the respective rake and reel arms passes, substantially as described.

Sixteenth, The combination of a combined rake and reel mounted upon a hinge joint cutting apparatus, and a yielding belt tightener, substantially as and for the purpose described.

Seventeenth, The employment of a yielding belt or chain tightener, or its equivalent, in connection with harvesters which are constructed with a hinged-joint cutting apparatus, substantially as and for the purpose described.

Eighteenth, The pulley support, Q, with its pulleys, W2 W2, in combination with a band or chain, N, and pulleys, W1 W3, substantially as and for the purpose set forth.

Nineteenth, Providing in a harvester with the rake attached to its hinged finger beam or platform, an extensible means for driving the rake, which will permit the platform and rake to rise and fall together and accommodate themselves, independently of the draft frame, to the undulations of the ground, substantially as described and for the purpose set forth.

2,225.—Knitting Machine.—Joseph Hollen (assignee by mesne assignments to John Nesmith), Blair, Penn. Patented July 16th, 1850—extended 7 years:

First, I claim forming the needle in the manner substantially as described, so that each needle shall be capable of being separately projected and withdrawn in the operation of knitting, by the application thereto of mechanism, substantially such as described, for producing these movements.

Second, I also claim the above described means of projecting and withdrawing the separate needles, or any other substantial equivalent of a knitting needle when used to perform its functions.

Third, I also claim the arrangement of the needles on a cylinder, in the manner described, in connection with the described means of moving or revolving the cylinder as a needle carrier.

Fourth, I also claim the combination of the jack, the sinkers and depressers, substantially as described.

Fifth, I also claim the thread bearer, v, having an extended sideway motion to and fro, at each stitch, by which it lays the thread across the needle at each stitch, and returns with it to be ready for the next stitch.

Sixth, I also claim the spring wire for regulating the supply of thread to the needle, opened by the rod, W, substantially as described.

Seventh, I also claim the particular arrangement and combination of the several parts of the machine by which their various motions are derived from a single crank and screw thread, substantially as described.

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RESULT OF THE VAN DE WATER WHEEL CHALLENGE.—MESSRS. EDITORS:—I see in your issue of the 24th inst., a notice with the above heading, with a very one-sided statement of a trial of my Water Wheel with Leffel & Co.'s, which was in every way unfair. The wheel that Leffel & Co put in Mr. Burbank's Mill was a new one, got up with great care, with polished steel buckets, after his first one was beat, using twenty inches more water than my wheel. According to Leffel & Co.'s table, twenty inches of water under fifteen feet head gives 6 44 horse-power. Now, 6 44 horse-power under fifteen feet head ought to grind six and one-half bushels of wheat per hour, or thirty-six barrels in 24 hours more than my wheel, and he only claims grinding 24 barrels in 24 hours, which would show the result of the trial to be in my favor. I am told by a party who knows all the particulars of the trial, that the stones which my wheel run were not in good order, and that it was an unfair trial. I had no notice, nor any one there to see to my interest in the matter. I do not know which drove the most machinery besides the mill stones; my wheel gives all the machinery in the mill except two smut mills. My wheel was all cast iron, rough as it came from the foundery, not polished buckets, the first tried from that pattern, using twenty inches less water under fifteen feet head, grinds twenty-four barrels flour less in twenty-four hours than the Leffel wheel. If I had been in Leffel & Co.'s place I should have kept quiet about that trial. I intend to build a wheel venting the same amount of water as the Leffel wheel, when I will let the public know the result. With regard to the challenge, my offer is still open for Leffel & Co.'s acceptance; the Five Thousand Dollars is still ready as I proposed, with a fair trial at grinding.

Below I give Mr. Burbank's certificate, saying my wheel used less water than the Leffel wheel. The new Leffel wheel vents the same as the old one. I see the certificate which Leffel & Co. publish says they did not measure the amount of water used, that it was only as fair a test as could be made without measuring water; as if the amount of water used was of no importance in a trial of the power of water wheels. Very respectfully,
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I find that it is perfectly free from all gummy matter, and that it does not stain the bright work of our machinery, as in the case with most all lubricating oils that are generally used for that purpose, after remaining a short time on the same.
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RESULT OF THE VAN DE WATER CHALLENGE. —MESSRS. EDITORS:—The readers of your valuable paper will recollect that in your issue of Nov. 11, 1865, Mr. Van De Water challenged any water-wheel builder to compete with his make of wheel for $500. In your issue of Dec. 9, 1865, I accepted his challenge, and named $5 000 as the competing sum and appointed Fairmount Water Works, Philadelphia, Pa., as the place of trial, where not only the relative merits but the actual percentage of each wheel (large or small) would be made known to the public.

Mr. Van De Water evaded this by proposing the test should be made in Rochester, N. Y. I had some thirty of my wheels at work in Rochester —one of them in G. W. Burbank's mill, that had been running three and a half years, which had three or four buckets knocked out. Mr. Van De Water put one of his wheels in the same mill, and by running against my wheel in that condition, deluded himself into the belief that his wheel was equal to mine. Hence the challenge. I replaced my wheel in Burbank's mill with one that was in order. Without any knowledge a test was recently made; for the result I refer you to the article below, signed by six responsible millers and mill owners of Rochester. This, Messrs. Editors, we suppose is the reason Mr. Van De Water evades the test after having made a public challenge. JAS. LEFFEL & CO.,
Springfield, Ohio, March 6, 1866. for Jas. Leffel.

ROCHESTER, N. Y., Feb. 28, 1866.

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The amount ground by the Leffel wheel exceeded that of the Van De Water wheel by twenty-four (24) barrels of flour in twenty-four hours.

The two wheels are in the same flume, and this is as fair a trial as can be made, in our opinion, without measuring the water. We consider the Leffel Double Turbine Water-wheel to be the best wheel in existence.

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Zur Beachtung für deutsche Erfinder.

Die Unterzeichneten haben eine Anleitung, die Erfindern das Verhalten angibt, um sich ihre Patente zu sichern, herausgegeben, und verabfolgen solche gratis an dieselben.

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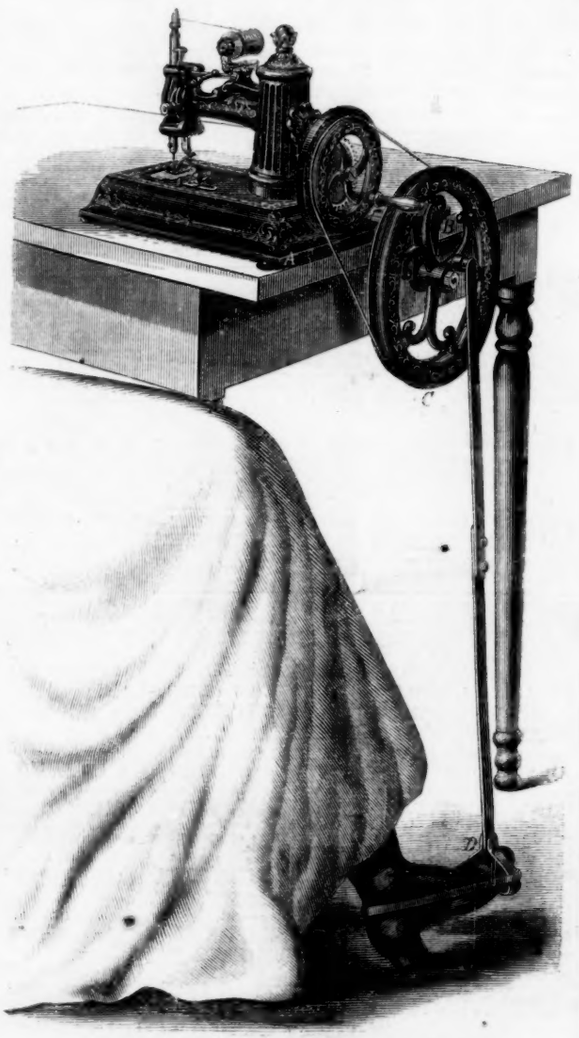
Improved Motion for Sewing Machines.

Many of the lower-priced sewing machines have no treadle or other means of applying power, except a small balance-wheel and a handle therein. It is difficult to get sufficient velocity on these machines without driving the hand and arm at such a rate that the operator is soon tired out; moreover one hand is always occupied in moving the machine so that attention is distracted from the work, which is often injured thereby. The engraving published herewith shows a method of attaching a treadle to such machines so that they are moved by the foot of the operator the same as all other machines. The treadle only has to be purchased where the operator has the machine, and not an expensive piece of cabinet work such as the table often is.

The method of attaching the treadle is as follows:—A cast-iron plate, A, is fitted to two studs on the bottom of the machine and is prolonged at the end furthest from the reader to receive a clamp, B, which carries the main driving wheel, C. From this wheel a rod proceeds to a stirrup, D, at the end, which constitutes a treadle, light and durable. It can be easily put on and taken off any table without marring the surface, and will greatly facilitate operations.

The machine to which the treadle is attached is very neatly got up and does good work for one of its class, that is, the single thread machine.

For further particulars address J. G. Folsom, Winchendon, Mass., who has an application pending before the Patent Office on this invention.



FOLSOM'S MOTION FOR SEWING MACHINES.

Academy of Sciences.

Father Secchi sent an account of the spectra of some stars, as seen by him recently in a new spectrometer by Merz, with a prism by Hofmann, of Paris. A drawing of the spectrum of *a* Orionis accompanied the communication. The spectrum of Sirius is decribed by the learned author as resembling that of sulphur.

M. De Vergnette-Lamotte sent a long memoir "On the Preservation of Wines by the Employment of Heat." M. Pasteur, reviving an old suggestion of Appert, proposes to heat wine for a few minutes to 75° or 80° C. The author objects to this, and says it is better to submit the wines for some time to a temperature not exceeding 45°. He seems to admit, however, that Appert's or Pasteur's plan answers well with the more saccharine and alcoholic wines, like ports and sherries, etc.

M. Fouque presented a memoir "On the Chemical Phenomena of Volcanoes." Only the general conclusions of the author are given in the *Comptes Rendus*, and the most interesting of these is the last. The author wished to demonstrate that the contact of sea water with the molten mass on which the solid crust of the earth rests is sufficient to account for all the eruptive phenomena. With this view he made some synthetical experiments, having for their object the reproduction of some of the substances he had found in the fumaroles of Mount Etna. In the course of his experiments he found that steam alone decomposes chloride of sodium, forming caustic soda and hydrochloric acid; and, further, that sulphate of lime and chloride of sodium react on each other in the presence of the vapor of water, producing sulphate of soda, and many other compounds he has noticed in volcanic emanations. Is it possible that the first of these observations may lead to the simplification of the soda process?—*Chemical News.*

Extension of Patents.

Many valuable patents are allowed to expire every year for the want of a little care on the part of patentees in not applying for an extension. The petition must be filed in the Patent Office at least ninety days before the expiration of the patent, which gives time for the preparation of testimony. Inventors who have patents dated in 1852, and who may wish to have them extended for seven years, can receive all necessary advice how to proceed, by addressing this office.

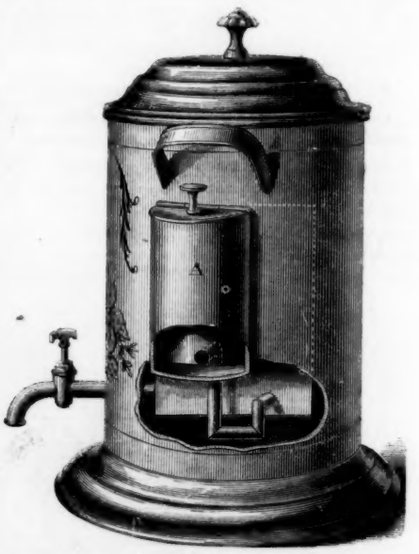
HOPKINS'S WATER COOLEER.

This water cooler is composed of an inner and an outer casing, with the intervening space filled with any non-conducting material. The inner casing is made to receive the ice as it is delivered to the consumer without the necessity of cutting away the corners and otherwise breaking it—as in the ordinary round cooler. The great loss of ice resulting from the necessity of cutting it into small pieces and exposing a much greater amount of surface to the water is avoided, while the external dimensions do not have to be any larger than in ordinary coolers.

After the block of ice is placed with the water in the cooler, as in ordinary ones, the covers are replaced and the water may be replenished through the reservoir, A, which is so arranged as to shut off all communication with the external air to the interior of the cooler. Hence, there is no necessity for removing the cover except to introduce more ice.

A glance at the reservoir will always indicate the hight of the water in the interior of the cooler. As the water is introduced gradually at the base of the ice, says the inventor, with the covers tight, it does not melt as rapidly as when poured upon it from above with the covers off, which, at the same time, admits the warm surrounding air.

It is claimed that this cooler will save from thirty-three to fifty per cent of ice, as it was in use last season, while the cost will be but a trifle more than ordinary coolers. Samples may be seen at the warerooms of J. Hall Reohrman, No. 606 Cherry street, Philadelphia, where orders will be received. State rights will be disposed of on application to the patentee, No. 1,107 Walnut street.



It was patented Jan. 16, 1866, by E. E. Hopkins, of Philadelphia, Pa.

FAST WORK.—Benj. F. Avery, of Louisville, Ky., informs us that for three months past he has finished 2,000 plows per week. He turned out over 622 in one day, which, we should say, was rapid work.

OF THE 529,241 persons who visited Kew Gardens last year 260,040 arrived on Sundays, and 269,201 on week days.

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